Army Code Nº
61747
(1978)
(D/GS(OR)2/1/8/3)

The information given in this document
is not to be communicated, either
directly or indirectly, to the press or to
any person not authorized to receive it.

USER HANDBOOK FOR

ROCKET AND LAUNCHER, 66mm, HEAT, L1
AND
ROCKET AND ADAPTOR, 21mm, 66mm SUB-CALIBRE, L1A1

(This publication supersedes Army Code Nº 60525 part 2N)

PUBLICATIONS SPONSOR
ASSISTANT CHIEF OF THE GENERAL STAFF
(OPERATIONAL REQUIREMENTS)
Ministry of Defence (Army)

PUBLICATIONS AUTHORITY
QUALITY ASSURANCE DIRECTORATE (WEAPONS)
Ministry of Defence (Procurement Executive)

Army Code Nº
61747
(1978)
(D/GS(OR)2/1/8/3)

The information given in this document
is not to be communicated, either
directly or indirectly, to the press or to
any person not authorized to receive it.

USER HANDBOOK FOR

ROCKET AND LAUNCHER, 66mm, HEAT, L1
AND
ROCKET AND ADAPTOR, 21mm, 66mm SUB-CALIBRE, L1A1

(This publication supersedes Army Code Nº 60525 part 2N)

PUBLICATIONS SPONSOR
ASSISTANT CHIEF OF THE GENERAL STAFF
(OPERATIONAL REQUIREMENTS)
Ministry of Defence (Army)

PUBLICATIONS AUTHORITY
QUALITY ASSURANCE DIRECTORATE (WEAPONS)
Ministry of Defence (Procurement Executive)

AMENDMENT RECORD

A.L. number	Date of incorporation	Signature	A.L. number	Date of incorporation	Signature
1			31		
2			32		
3			33		
4			34		
5			35		
6			36		
7			37		
8			38		
9			39		
10			40		
11			41		
12			42		
13			43		
14			44		
15			45		
16			46		
17			47		
18			48		
19			49		
20			50		
21			51		
22			52		
23			53		
24			54		
25			55		
26			56		
27			57		
28			58		
29			59		
30			60		

CONTENTS

Page

List of Illustrations (vi)

List of Associated Publications (vii)

CHAPTER ONE - DESCRIPTION

Para

Section 1 - Introduction

General

104 The System 1

Advanced Models

109 L1A1 - Pinned 2
110 L1A2 2
111 L1A3 3
112 L1A3 B1 3

Section 2 - Launcher

113 Introduction 5
114 Launcher (L1A1 System) 5
115 Inner (Rear) Tube 5
116 Outer (Front)Tube 6
117 Rear Cover 6
118 Firing Mechanism 7
119 Safety Mechanism 7
120 Guide Rail & Detent Lever 10

Sights

121 Foresight 12
122 Backsight 13
123 Operational Informative Marking 13
124 Sling Assembly 14

Section 3 - Rocket

125 Introduction 15
126 Nose Cap Assembly 15
127 Warhead, HE, M18 15
128 Rocket Motor, M54 17
129 Round Lock 18
130 Action 18

CONTENTS(Contd)

Para Page

Section 4 - M412 Fuze

131 Introduction 19

Assemblies

133 Cover 19
134 Rotor 19
135 Escapement Mechanism 21
136 Graze 21
137 Percussion Detonator 21
138 Electric Detonator 21
139 Set-Back 21
140 Firing Pin, Spring & Base Plug 23

Action

141 On Firing 23
142 On Direct Impact 23
143 Graze Impact 24

Safety

144 Before Firing 24
145 On Firing 25

Section 5 - Rocket, 21mm, 66mm Sub-Calibre, L1A1 - Adaptor, 21mm, 66mm Sub-Calibre, L1A1

146 Introduction 27
151 Adaptor 27
153 Rocket 28
155 Action 28

Section 6 - Miscellaneous Data 29

Section 7 - Packaging & Marking 29

CONTENTS(Contd)

Para Page

CHAPTER TWO - OPERATION

Section 1 - 66mm Launcher

201 Introduction 35
202 Extending the Launcher/Cocking 35
203 Safe/Arm (Safety) Catch 37
204 Firing 37
205 Telescoping the Launcher 37
206 66mm Rocket & Fuze 37

Section 2 - L1 Launcher fitted with the 21mm Sub-Calibre Adaptor

207 Introduction 39
208 Loading 39
209 Reloading 40

Section 3 - L1 HEAT 66mm Rocket & Launcher - 21mm 'Training System'

210 Introduction 41
211 Carrying the Weapon System 41
212 Preparation For Firing 41
213 Firing 42
214 Making An Unfired System Safe 42

Failures to Fire

216 Misfire 42
217 Hangfire 42
218 Action For Misfire 43
219 21mm 'Training System' 43

CHAPTER THREE - MAINTENANCE & INSPECTION

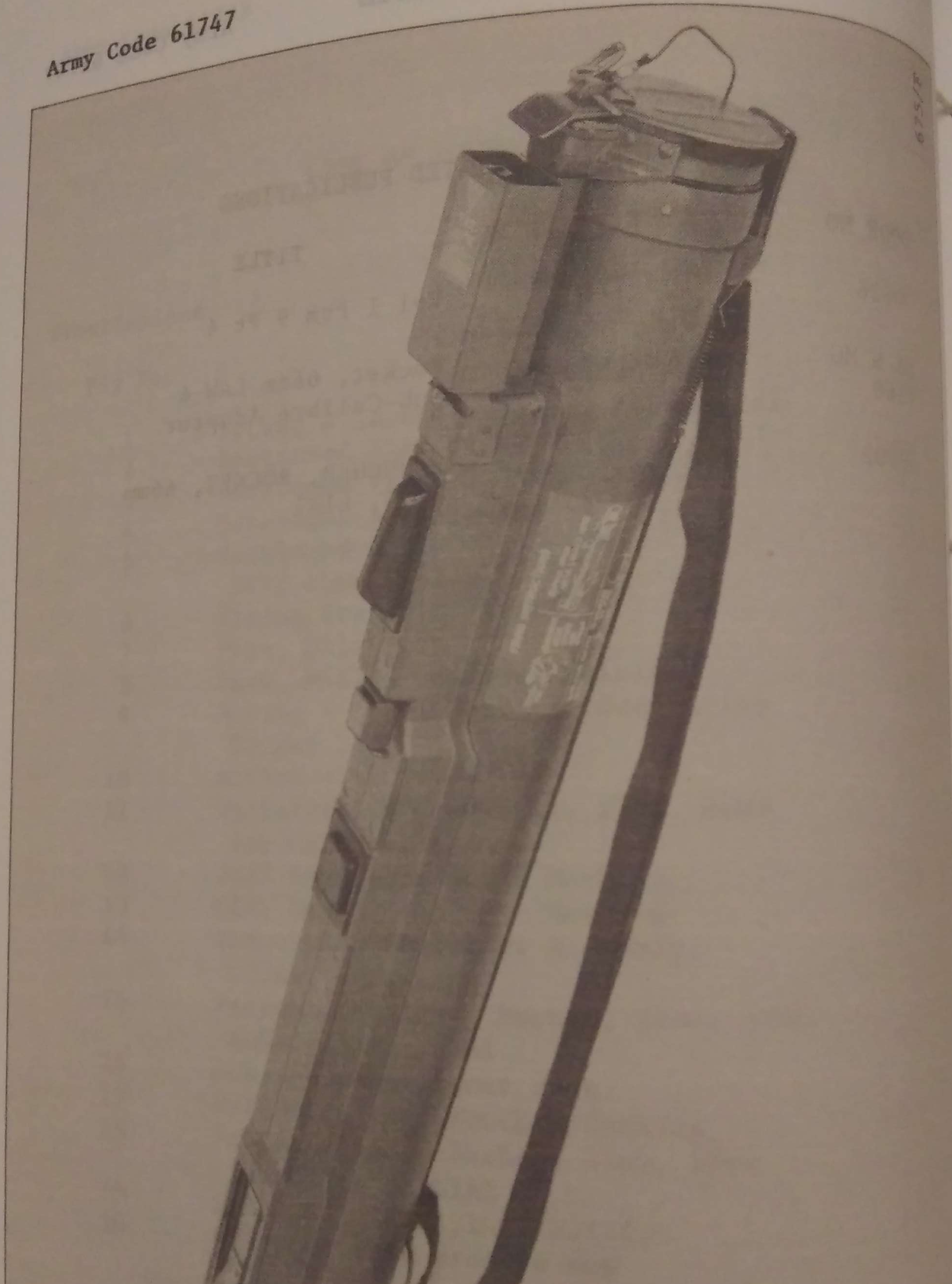
66mm 'Weapon System' 45
21mm 'Training System' 47
304 Cleaning - Before Firing 47
305 - During Firing 47
306 - After Firing

LIST OF ILLUSTRATIONS

		Page
Frontispiece		viii
Fig No		
1	Rocket & Launcher, 66mm, HEAT, L1A1	4
2	Sectioned View of Launcher	8
3	Sectioned View of Mechanisms	9
4	Foresight & Rearsight	12
5	Sectioned & Exploded Views: HEAT 66mm Rocket (L1A1)	16
6	Firing Train of System	18
7	Fuze, M412	20
8	Fuze, M412 - Unarmed Position	22
9	Action - Fuze, M412 - Armed During Flight	24
10	Action - On Impact	25
11	Installation - Adaptor, 21mm, 66mm Sub-Calibre, L1A1	26
12	HEAT 66mm Launcher - Marking	30
13	HEAT 66mm Rocket - Marking	31
14	Ammunition Container Assembly, L238A1 - Marking	32
15	Package Details - Rocket, 21mm, 66mm	
16	Sub-Calibre, L1A1	33
17	ACA, L238A1 - Inner Pack	34
18	Extending the Launcher/Cocking	36
	Installation - Rocket, 21mm, 66mm	
19	Sub-Calibre, L1A1	39
20	Launcher - Carrying Position	40
	Cleaning Rod, Brush & Mop	46

LIST OF ASSOCIATED PUBLICATIONS

CODE NO	TYPE	TITLE
70626	Inf Trg	Vol 1 Pam 9 Pt 4
SA & MG V160	EMER	Rocket, 66mm LAW & Sub-Calibre Adaptor
39202	CES	LAUNCHER, ROCKET, 66mm HEAT, L1A1



Frontispi

CHAPTER 1

DESCRIPTION

SECTION 1 - INTRODUCTION

GENERAL

101. Based on an American design, the L1 HEAT 66 millimetre Rocket and Launcher is an improved version of the M72 66mm Anti-Tank Weapon (LAW) used by NATO forces.

102. After modification to the design (para 113), the 'weapon system' was introduced into British Service, finally, as the ROCKET AND LAUNCHER, 66 millimetre, HEAT, L1A1 and continued development has led to the introduction of advanced models (para 108).

103. With an excellent probability of a hit at short and intermediate ranges, having an effective sighting range of 325 metres, the system provides the user with a close-in defence against the majority of tanks likely to be encountered on the battlefield, together with an effective means of defeating armour in general, gun emplacements, field fortifications and other hard targets.

104. The System Comprises:

a. Launcher. The launcher consists of two tubes housed one inside the other to form a telescopic extension. The sighting system is situated along the top surface of the outer tube together with the safety and firing mechanisms, both of which are interconnected with the inner tube.

b. Rocket. Housed within the launcher inner tube, the rocket consists of a fin stabilised rocket motor fitted with a base fuze, warhead and piezo-electric initiator.

c. Sling Assembly. This consists of a webbing strap to which is attached a sprung metal strip acting on a closure for the forward end of the launcher.

105. Lightweight and compact in size, the pre-loaded weapon system, fired by an individual from any of the normal rifle firing positions, is extremely easy to operate requiring the minimum of training and instruction to be given to the user.

106. The launcher serving as a protective package for the rocket, the system is completely waterproof, requiring no maintenance and the minimum of logistic support, with a good shelf life and is ready for immediate use within the operating temperature range -40°C to 60°C (-40°F to 140°F).

107. The rocket warhead incorporates two methods of initiation, ensuring detonation when a miss occurs; a desirable feature during training since the problem of blinds is virtually eliminated.

WARNING

A blast danger area in the form of a cone, it's apex at the firing position, extends rearward for a distance of 40 metres with a base diameter of 25 metres.

ADVANCED MODELS

108. The information presented in this publication regarding the L1A1 version of the Rocket and Launcher applies equally to the advanced models with the following exceptions.

109. ROCKET AND LAUNCHER, 66mm, HEAT, L1A1 - PINNED. This model differs from the L1A1 model in that the introduction of a pin, by modification action, prevents the possible over extension of the two tubes, leading to a premature firing, when extending the launcher. See para 120 and Note.

110. ROCKET AND LAUNCHER, 66mm, HEAT, L1A2. This model differs from the earlier models in that several design changes have been incorporated, including one to obviate the need for pinning and the painting of a black band around the inner tube. See para 120 and Note.

111. ROCKET AND LAUNCHER, 66mm, HEAT, L1A3. This model differs from the earlier models in having an improved warhead (M18A1), in which the insulated lead and conduit are replaced by a flexible electric cable, fitted to the rocket and a coating of silver applied between the nose cap and the ogive to reduce radio frequency (RF) pickup. In addition, this model saw the adoption of a rubber washer in place of the spring at the base of the fuze.

112. ROCKET AND LAUNCHER, 66mm, HEAT, L1A3B1. This model differs from the L1A3 in that a copper-epoxy resin composition is applied between the nose cap/ogive and the ogive/body joint to reduce RF pickup.

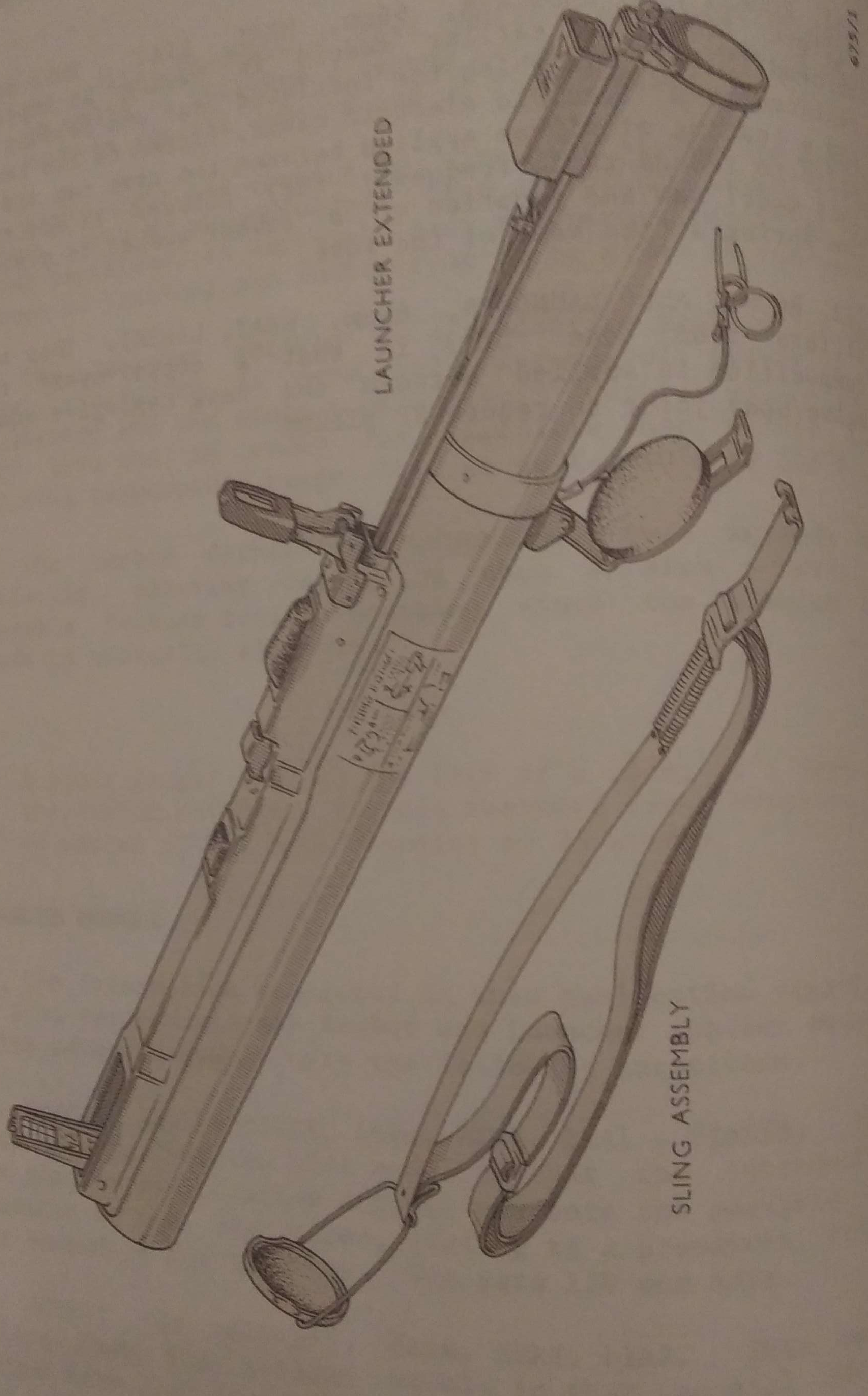


Fig 1 Rocket and Launcher, 66mm, HEAT, L1A1

SECTION 2 - LAUNCHER

113. Introduction (Fig 1). A modified version of the American M72 LAW, the launcher used with the L1A1 model of the 'weapon system' included several design modifications, resulting in the following advantages:

a. A more robust item.

b. Fewer protrusions on the surface, more streamlined and easier to handle.

c. The risk of breakage eliminated, when cocking, by the introduction of a steel rod to replace the firing pin cable.

d. Movement of the firing pin prevented, until the launcher is extended, by the introduction of the safety stud.

e. A better form of front and rear sights.

f. Only one safety mechanism has to be released in order to fire the rocket.

114. Launcher (L1A1 System). The launcher comprises an inner tube forming a telescopic extension to an outer tube. Along the top of the outer tube, the rectangular box-like trigger mechanism housing houses the trigger mechanism, safety catch, detent lever assembly, foresight and guide rail. Attached to the inner tube at the rear end, the guide rail houses the firing pin rod and the safety stud. The back sight is mounted on a bracket at the rear of the trigger mechanism housing, whilst its housing is located above the firing pin mechanism at the rear of the inner tube.

115. Inner (Rear) Tube. Made in aluminium alloy, the cylindrical inner tube has a re-inforcing collar around the rear end, forming a seating for a sealing ring, to which is attached a hollow bracket, closed at its rear end by a cover

plate, to house the percussion primer. Secured to the front face of the bracket, the firing pin housing has a short length of rectangular tubing fixed to its top surface, forming a housing for the backsight and the guide rail projecting forward from it to enter the trigger mechanism housing on top of the outer tube. A drilled lug protruding rearward from the bracket cover plate receives one arm of the safety pin to secure the end cover, attached to the outer tube, in position. To indicate the amount of movement required when extending the launcher, a black band is painted around the tube.

116. Outer (Front) Tube. Manufactured from high strength resin impregnated glass fibre, with a metal collar around the rear end to which the bracket for the rear cover is attached, the outer tube has the trigger mechanism housing permanently affixed along its upper surface. An opening in the top of the housing, at the forward end, permits the spring loaded foresight to emerge from within the housing as the launcher is extended. Two other openings in the top surface, both sealed with rubber 'boots', permit, in one instance, engagement of the detent lever to lock the launcher in the extended position and, the other, protrusion of the trigger. Faced with a resilient material, two further holes allow one, the emergence of the safety catch stem and two, the entry of the guide rail at the rear of the housing. A bracket mounted astride the rear end of the housing forms the mounting point for the rear sight. Seated within a groove in the interior of the metal re-inforcing collar a sealing ring, together with that around the inner tube, serves to render the launcher watertight.

117. Rear Cover. Pivoting about a pin through the bracket at the rear underside of the outer tube, the rear cover takes the form of a circular metal plate, faced with a resilient pad, with an extended tongue. A rectangular hole in the tongue mates with the lug on the bracket cover plate, located at the rear of the inner tube and a slot in the circular plate receives the Round Lock, to position and secure the Round (rocket) within the launcher with the aid of the safety pin.

118. Firing Mechanism (Fig 2). The firing mechanism comprises a trigger acting on the firing pin rod, an extension of the spring loaded firing pin:

a. Trigger. Pivoting about two rivets, the spring loaded trigger takes the form of a metal lever, the top end of which protrudes through its housing on the outer tube, beneath a rubber 'boot', whilst the lower end is formed with two lugs to act as sears.

b. Firing Pin and Rod. Lying in the guide rail, loosely retained by a pin allowing longitudinal movement, the firing pin rod, a flat metal strip, is formed near the forward end with a bent to engage the trigger sears. Forward of the bent a slot through the rod accommodates the safety sear. The rear end of the rod, within the firing pin housing, is shaped to form the firing pin and is surrounded by two helical compression springs separated by two washers and a transverse pin.

119. Safety Mechanism. Various safety features are incorporated in the design of the launcher:

a. Safety Sear (Fig 3). Pivoting about the forward end of the guide rail, the spring loaded safety sear protrudes through the slot in the firing pin rod and a matching hole in the bottom of the guide rail, to limit movement of the rod, this applies whether the launcher be closed or extended. When closed, the physical dimensions of the trigger mechanism housing restrict movement of the sear, but in order to positively prevent movement of the rod the safety stud is incorporated.

b. Safety stud. This takes the form of a stud mounted on a spring strip rivetted to the firing pin rod, forward of the firing pin housing. When the launcher is closed, the stud is forced downwards to pass through a hole in the rod and a matching hole in the guide rail, pinning the rod and rail together. On the launcher being extended, the spring strip withdraws the stud, separating the rod and rail.

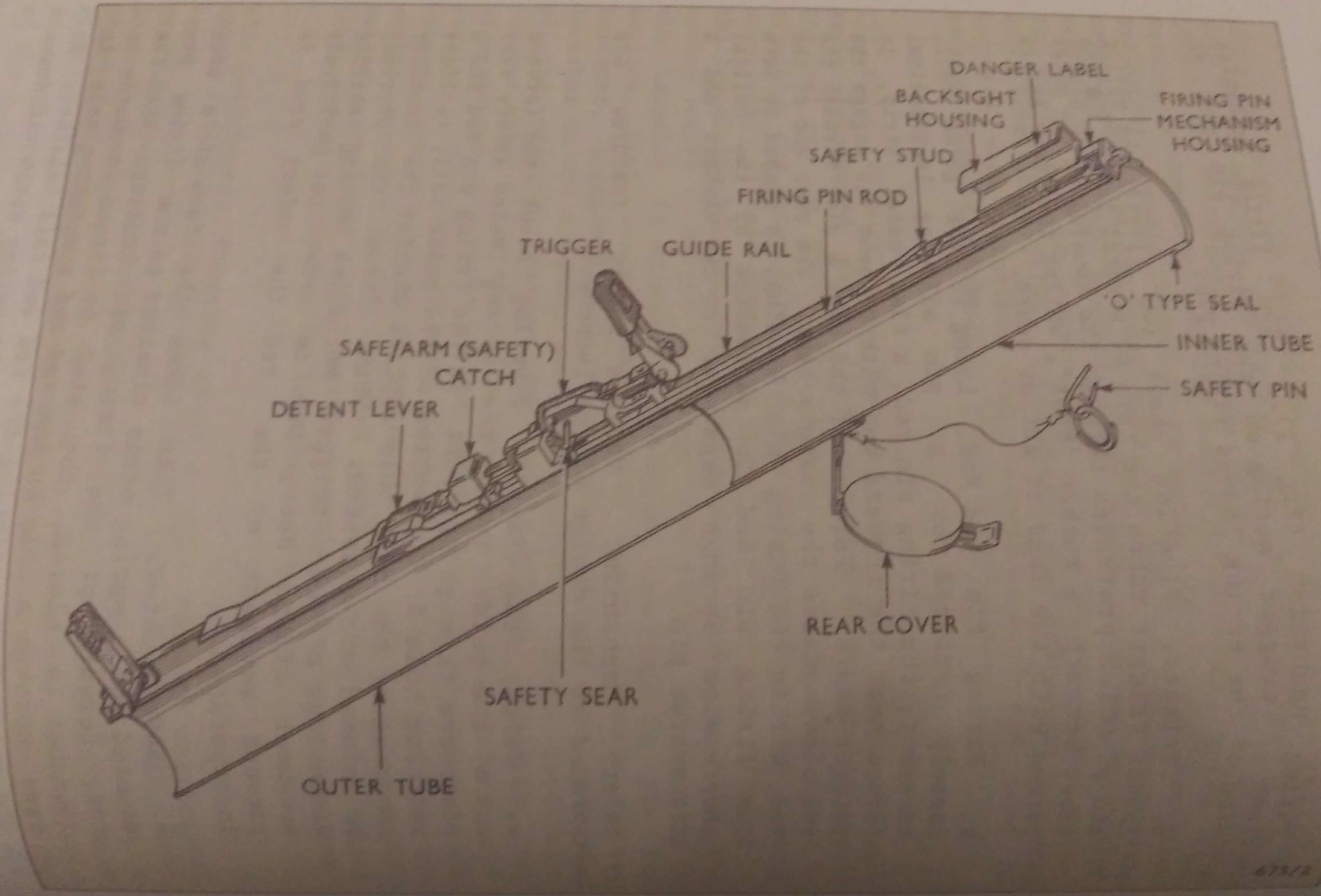


Fig 2 Sectioned Vi

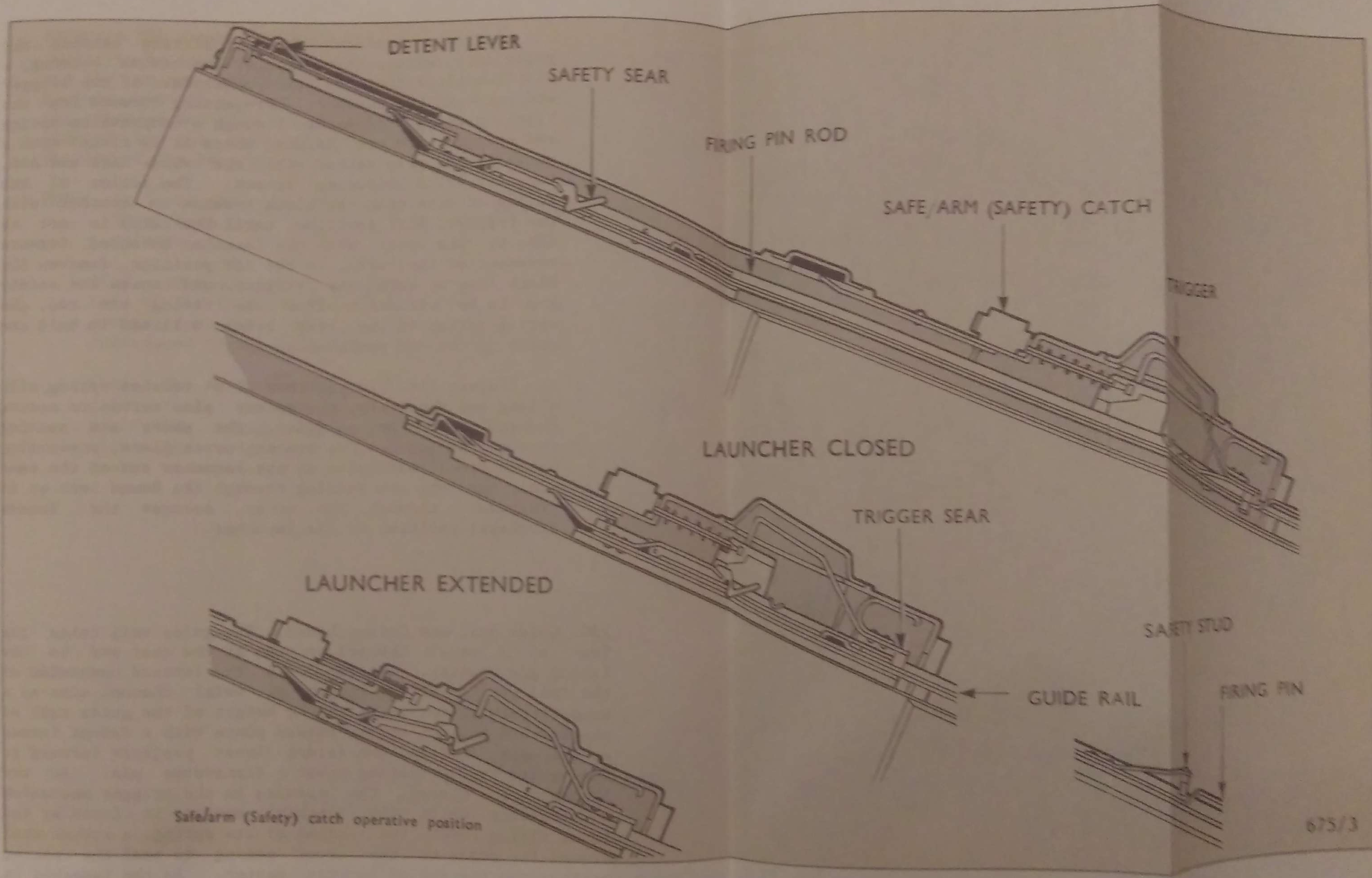


Fig 3 Sectioned View of Mechanisms

c. SAFE/ARM (Safety) Catch. Sitting astride the guide rail within the trigger mechanism housing, a plastics block contacts the underside of the trigger and prevents its movement. Projecting forward from the block, a metal rod passes through a compression spring and emerges from the housing where it is fitted with a metal finger grip marked with the words SAFE and ARM together with opposing arrows. The action of the spring ensures that the block remains in contact with the trigger, SAFE position, until the catch is set to ARM by the user. With the launcher extended, forward movement of the catch, to the ARM position, removes the block from beneath the trigger and causes the safety sear to be withdrawn from the firing pin rod, the spring action on the sear being utilised to hold the catch in the ARM position.

d. Safety Pin. In the form of a torsion spring with a long and short arm, the safety pin serves to secure the end cover in position, the short arm passing through the lug on the bracket cover plate, preventing unintentional extension of the launcher and at the same time, the long arm passing through the Round Lock as it protrudes through the cover, secures the Rounds (rockets) position in the launcher.

120. Guide Rail and Detent Lever. The guide rail takes the form of a metal channel secured at the rear end to the firing pin housing. Fastened to the forward underside of the rail an inverted length of metal channel acts as a support serving to maintain the height of the guide rail at the forward end. A spring loaded plate with a detent formed on its upper surface, the detent lever projects forward of the guide rail, pivoting about a transverse pin. As the launcher is closed, the opening in the trigger mechanism housing from which the foresight emerges is closed by the lever rising under the action of its spring, a rubber seal around the edges of the lever acting to seal the opening against the ingress of foreign matter. As the launcher is

extended the lever, guided by a spring plate fastened to the inner top surface of the trigger mechanism housing, rises and the detent engages the forward edge of the hole in the housing, beneath a rubber 'boot', to lock the launcher in the extended position. The amount of extension possible is limited by the rear of the lever contacting a waisted portion of the housing.

NOTE: It is in this area that the most significant changes have been made to the launcher, for reasons of safety.

L1A1 - Pinned. A pin passing transversely through the rear of the trigger mechanism housing, acting as a stop contacted by the rear end of the guide rail support, introduced to prevent over extension of the launcher.

L1A2. The metal channel, used as a support for the guide rail, replaced by a tough plastics block with protruding 'wings' which contact internal stop faces within the trigger mechanism housing, to limit the amount of extension possible.

SIGHTS (FIG 4)

121. Foresight. Mounted on a plastics bearing bush pivoting about a transverse pin through the forward end of the trigger mechanism housing, the spring loaded foresight assumes a vertical position on extension of the launcher. It comprises a re-inforced open metal bracket, acted on by a torsion spring, to which a rectangular plastics scale plate is affixed. The plate has a rectangular hole in its upper half across which are located three wires, placed horizontally, and one centrally placed vertical wire forming an extension of a central line marked in red on the lower half of the plate. The top edge of the opening in the plate represents the 50 metre sight graduation, the cross wires, the 100, 150, 200m graduations and the lower edge of the opening the 250m graduation, the first to be identified in red. Below the 250m graduation, four red horizontal lines represent the 275, 300, 325 and 350m graduations, of these the 300 and 350m graduations are identified. In addition, two diverging lines appear in red together with four positive (+) signs. Formed on top of the scale plate, a small protrusion carries a luminous spot, used as a battle sight in conjunction with the large aperture in the backsight.

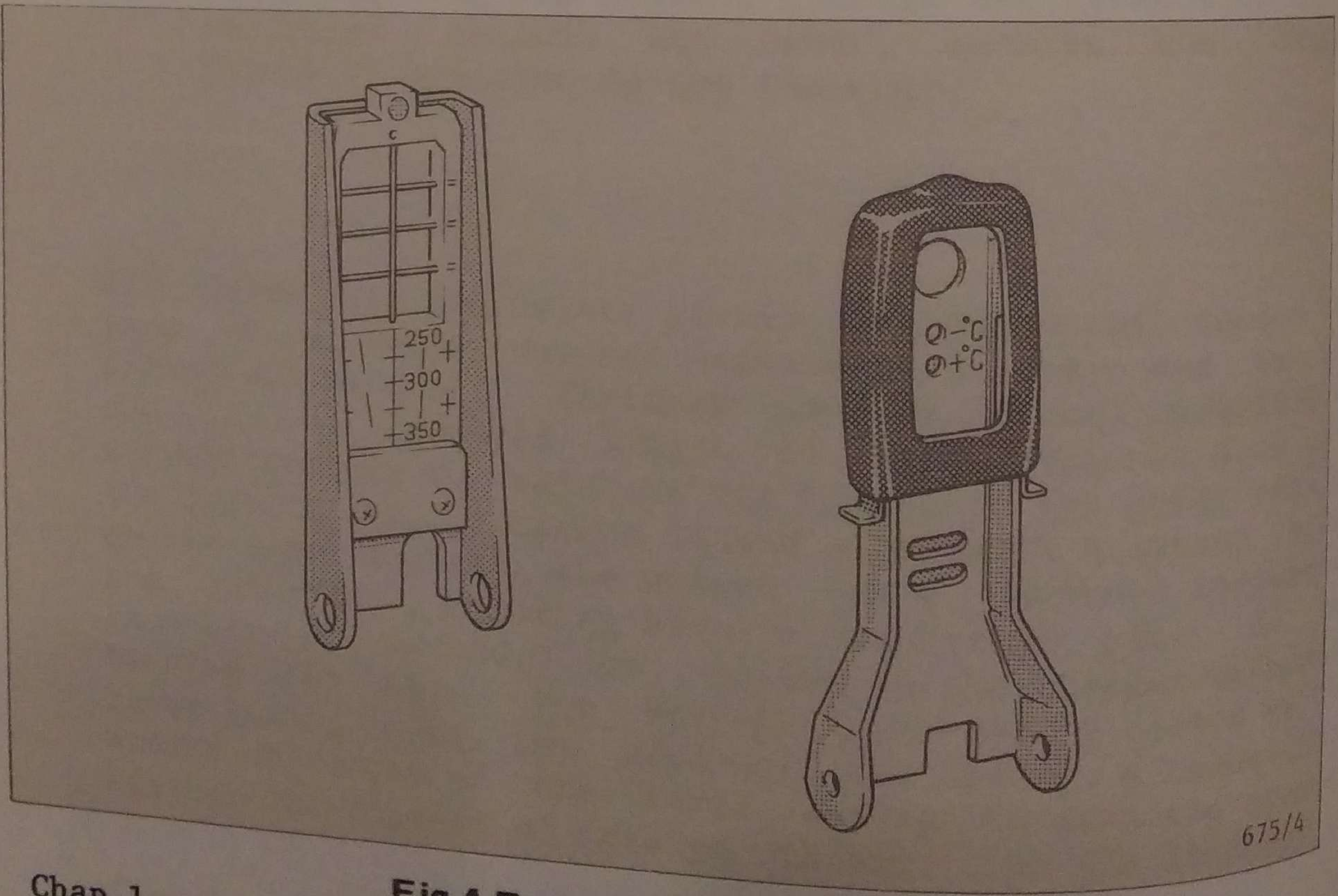


Fig 4 Foresight and Rearsight

122. Rearsight. Mounted on a bracket at the rear of the trigger mechanism housing, the spring loaded rearsight assumes a vertical position on extension of the launcher. It comprises a re-inforced metal plate, acted on by a torsion spring, in which three holes are arranged vertically, the topmost hole, the largest, acting as a battle sight. The ambient temperature having an effect on the rocket ballistics, choice is made between the remaining two holes for use as a sight aperture and they are marked accordingly, either -°C or +°C. In order to blank off one or the other of the two holes, a metal slide is fitted around the sight its position registered by a detent engaging one of two slots present in the sight. An open rubber 'boot' fitted over the sight affords the user a degree of protection from sharp metallic edges.

123. Operational Informative Marking. The following markings, useful to the user, appear:

a. Instructions on how to fire; in cartoon form on a self adhesive label affixed to the left hand side of the outer tube, beneath the trigger.

b. A reminder to the user regarding the presence of a rear blast area; as a self adhesive label affixed to the top of the backsight housing.

c. The temperature range of operation (-40°C:60°C): stencilled on the underside of the outer tube.

124. Sling Assembly. The assembly consists of a metal strip with a wire loop attached at the forward end forming a hinge. Pivoting about the forward end of the loop a metal cap, lined with a resilient pad, acts as a closure for the forward end of the launcher. At the rear end of the strip a flat metal hook, the end of which is formed to engage two depressions in the rear cover, is attached by means of two tension springs providing the flexibility required to fit the assembly and the tension to hold the cap in position. An adjustable webbing strap, one end attached to the hook, the other to the forward end of the metal strip, completes the assembly.

SECTION 3 - ROCKET

125. Introduction (Fig 5). The HEAT 66mm Rocket is a lightweight, fin stabilized, fixed round of anti-tank ammunition comprising a nose cap assembly, M18 warhead, M412 fuze, M54 rocket motor and M56 igniter assembly. Approximately 508mm (20 inches) long, weighing approximately 1kg (2.31b), the rocket is issued preloaded in the launcher from which it is fired. The warhead, together with the fuze and its housing, weighing approximately 0.5kg (1.21b) and measuring approximately 290mm (11.5 inches) in length, contains about 0.3kg (0.671b) of high explosive (HE) in the form of a shaped charge.

126. Nose Cap Assembly. The nose cap assembly comprises a thin conical aluminium alloy cap, indented around the mouth in three places to engage the ogive, containing a piezo-electric element encapsulated in an epoxy resin. The element comprises a piezo-electric transducer in the form of a ceramic disc, barium titanate, to which is affixed an earthing terminal pin, attached to a thin brass disc and a centrally placed positive terminal pin. Use is made of a conductive cement in forming the assembly which also includes a 0.15 megohm resistor across the pins.

127. Warhead, HE, M18. A self contained unit, the M18 HE Warhead is an assembly based on a thin steel hollow cone, the body, in the mouth of which is secured a thin copper hollow cone, the space between being filled with high explosive. Pressed in position onto the front of the body, to produce the required degree of stand-off between the initiator (piezo-electric element) and the shaped HE charge, the aluminium alloy ogive is closed at the forward end by the fitment of an insulated block fitted with two terminal sockets. An insulated wire, connected to the central socket, running the length of the warhead, through a length of brass tubing (conduit) soldered to the interior of the body, provides the positive lead from the initiator to the fuze. The conduit, being connected to the second (earth) socket in the block, forms the earth return for the circuit, but see para 110. Indentations around the forward end of

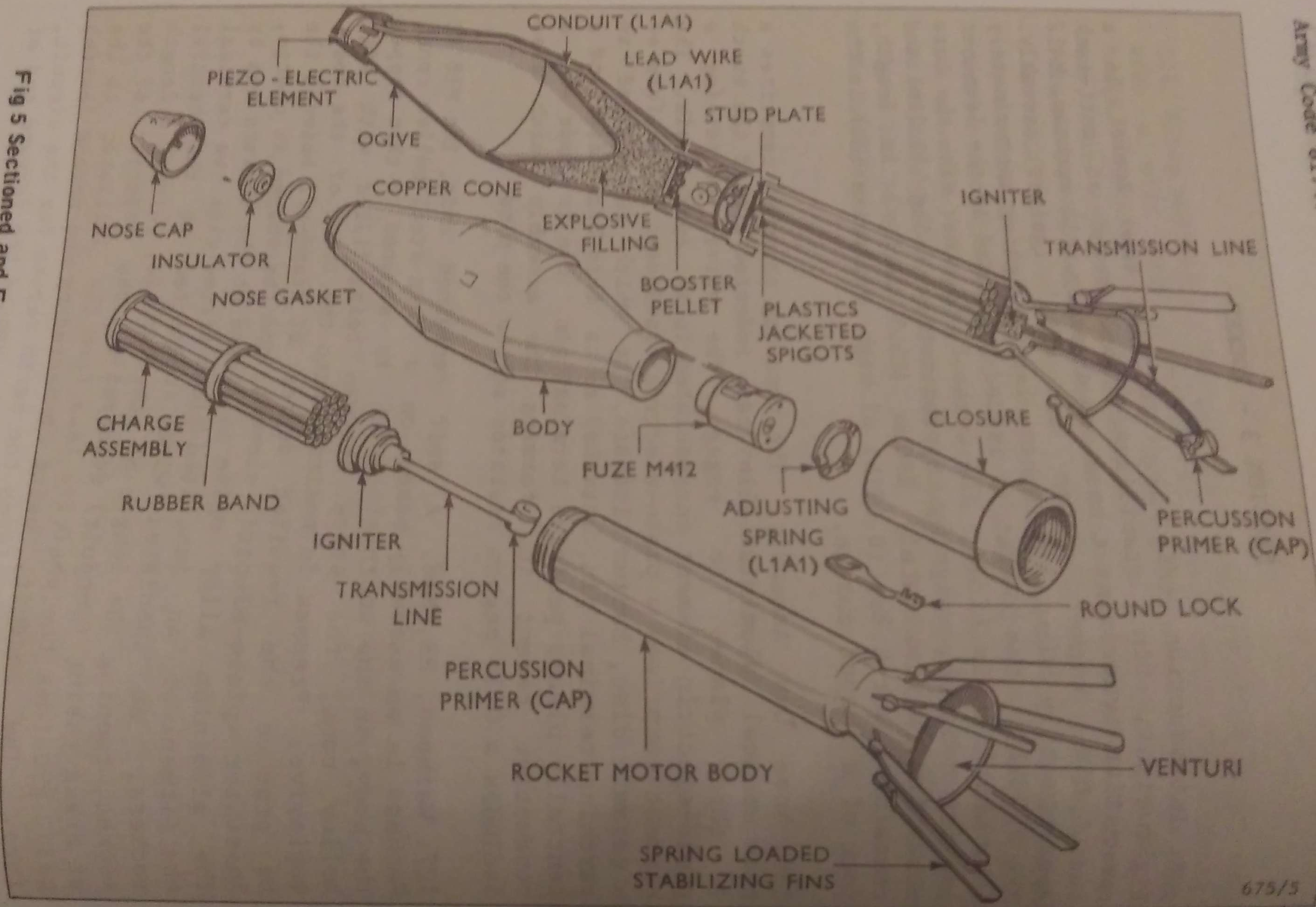


Fig 5 Sectioned and Exploded Views:- HEAT 66mm Rocket (L1A1)

the ogive receive the detents formed in the nose cap, to register its position, the nose cap being fitted such that the two terminal pins within the cap engage the sockets in the ogive, putting the initiator in circuit. At the rear end of the body a spigot is formed to receive the closure, soldered in position and the HE filling is recessed to receive the booster pellet. The closure, which forms the housing for the M412 fuze and a spring located at the base of the fuze ensuring contact between it and the main charge, takes the form of a high tensile aluminium alloy tubular item closed at the rear with a thick, recessed base, internally screw threaded to receive the rocket motor.

128. Rocket Motor, M54. Screwed into the rear of the M18 warhead, the rocket motor comprises a high tensile aluminium alloy tubular body containing sticks of tubular propellant and an M56 igniter assembly. The body is externally screw threaded at the forward end whilst at the rear it is waisted and then increased in diameter to form a cone, the venturi. Six integral lugs, equally spaced around the exterior of the cone, form pivot points for the spring loaded aluminium alloy stabilising fins. Inserted into the forward end of the motor body, the propellant charge is in the form of an assembly comprising a circular steel disc (stud plate) from which 19 plastics jacketed short spigots protrude, each spigot having a length of tubular propellant pressed on to it. A shoulder around the edge of the plate, mating with the internal diameter of the motor body, centralises the charge assembly within the body. Manufactured almost entirely in plastics materials the M56 igniter assembly takes the form of a waisted cup-like body joined, by a length of tubing, to a block containing a brass percussion cap holder. The body, closed by a plastics disc, is filled with gunpowder and the tubing (transmission line/fuze) with nitrocellulose. Completing the assembly, the M29A1 percussion primer (cap) comprises a brass cup, containing a primer mixture, closed by a dimpled insert (anvil) with two fire holes in it, a thin foil covering to the primer mixture preventing losses.

129. Round Lock. Manufactured in thin steel plate, the Round Lock is shaped at its forward end to fit around a fin mounting lug on the motor body and at the rear end to pass through the rear cover of the launcher, presenting a hole to one leg of the safety pin. Forward of the hole the material is waisted and slotted to form a shear point, the upright edge forward of this point engaging the edge of the launcher tube.

130. Action (Fig 6). On being struck by the launcher firing pin, the percussion primer cap is impacted against the anvil causing the filling to ignite. The flash caused by this action, passing through the fire holes, travels along the transmission line/fuze to ignite the igniter composition which boosts the flash sufficient to ignite the propellant charge. Reaction to the propellant gases escaping rearward through the venturi, having destroyed the plastics igniter body, produces a thrust on the rocket which, on becoming sufficient to shear the Round Lock, expels the rocket from the launcher, the all-burnt condition being achieved before the rocket leaves the launcher.

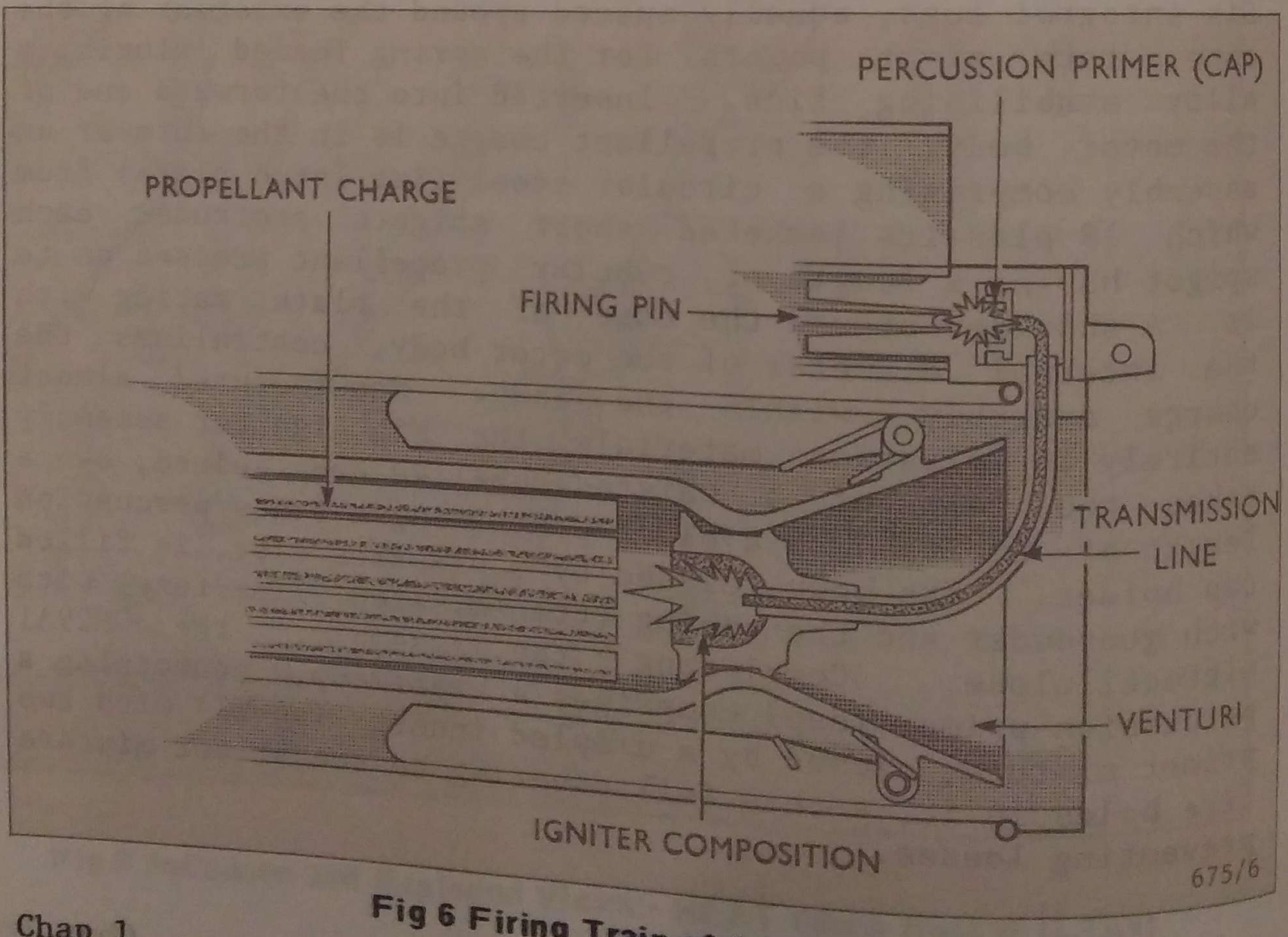


Fig 6 Firing Train of System

SECTION 4 - M412 FUZE

131. Introduction (Figs 7 & 8). As part of the 66mm rocket, the American designed M412 fuze is located in its housing, within the warhead, at the base of the shaped HE charge, containing both a percussion and an electric detonator, the fuze has two means of initiation, providing the warhead with the means of functioning by both graze and direct action.

ASSEMBLIES

132. The assemblies used to make up the fuze are mounted within a framework secured to the baseplate and are covered by a metal cap, the mouth of which fits over a rim around the baseplate.

133. Cover. Manufactured in brass, the cover has a hole cut in it, serving as an inspection point and two electrical terminals fitted to it, serving, one as an earth continuity contact and the other as a terminal for the electrical input to the fuze. A separate compartment at the forward end of the cover forms a housing for an explosive booster pellet.

134. Rotor. Lying in a horizontal position within the fuze frame, the aluminium alloy rotor body rotates about a pivot formed on each end. A gear wheel around the periphery at one end of the body meshes with the escapement mechanism, whilst at the other end, the pivot protrudes through the frame, where it is slotted to receive one leg of a torsion spring. A stud, formed on the end of the body adjacent to the slotted pivot, protrudes through a curved slot in the frame, limiting the movement of the rotor to 90°. Two recesses, side by side across the body diameter, form housings for the two detonators and a flattened surface on the side of the body forms the location for the rotor electrical contact, a two pronged item serving to 'short out' the electric detonator in the unarmed (safe) condition and to connect it to the electrical input when armed. A slot around a portion of the body acts as an interlock with the graze assembly.

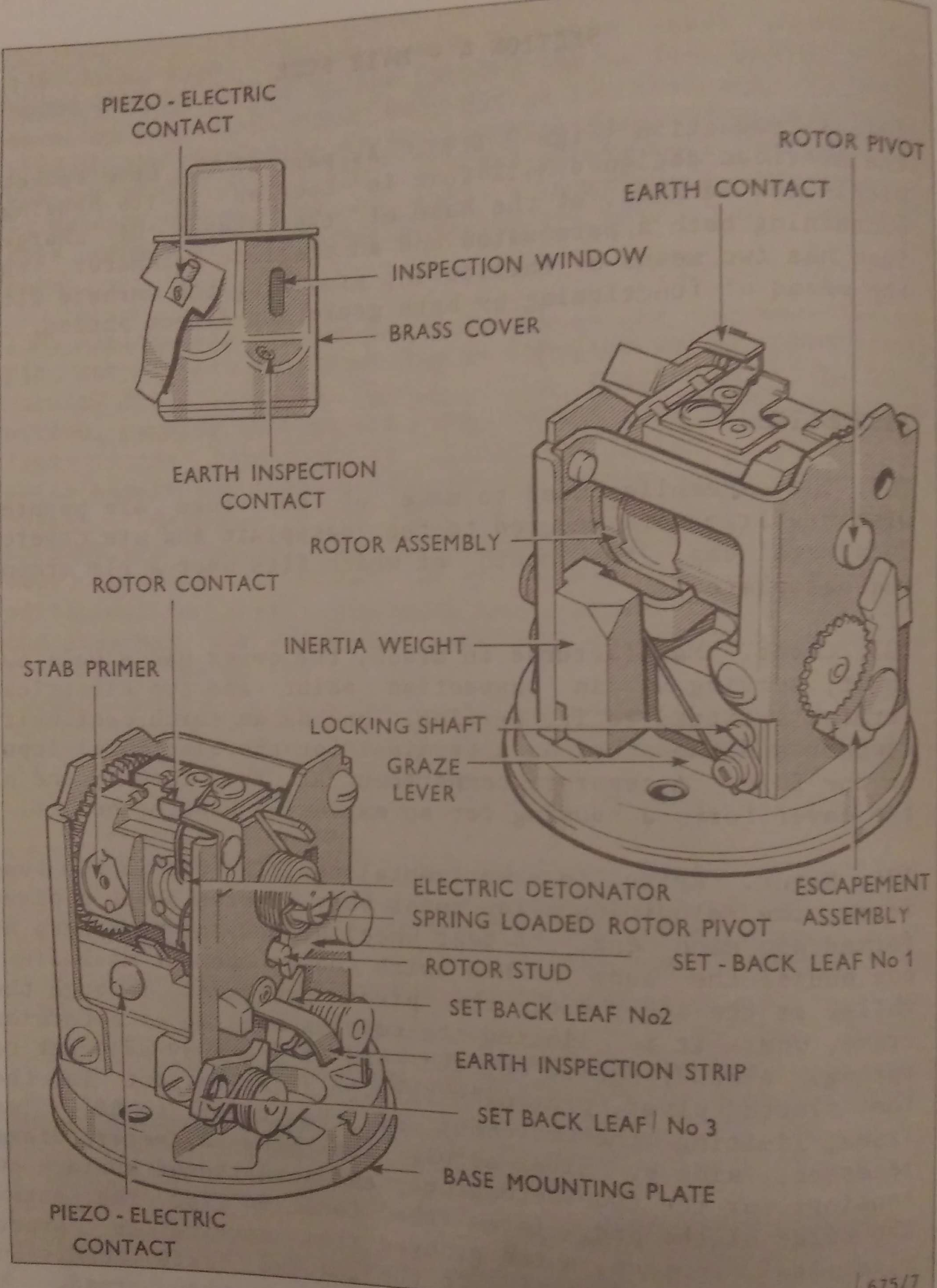


Fig 7 Fuze, M412

135. Escapement Mechanism. This assembly comprises an oscillating pallet, moving about a pivot mounted on the exterior of the fuze frame, with two points on it which alternately engage the teeth formed on the star (escapement) wheel, the pinion of which passes through the frame to mesh with the rotor gear wheel.

136. Graze. This assembly comprises a spring loaded lever the long arm of which is formed to enter the slot in the rotor body (safe condition) and has a relatively heavy block of metal attached to it acting as an inertia weight, whilst the short arm has a bent formed on it to engage a machined flat on the end of the locking shaft preventing its rotation. A second flat, machined about the mid point of the shaft, lies across the face of the shoulder on the firing pin.

137. Percussion Detonator. Known in American service as the M106 Stab Primer, the percussion detonator consists of a tubular metal case, closed at each end with a primer disc, containing three layers (charges) of sensitive explosive composition; at the rear a charge of 165mg type 1 lead azide, followed by 155mg of the same composition and 103mg of a priming composition.

138. Electric Detonator. The M48 electric detonator consists of a metal cup into which is pressed a charge of PETN, followed by a priming charge. Closure of the cup is achieved by the insertion of a loading assembly plug, from which two electric wires protrude, crimped in position by turning the metal at the mouth of the cup inward.

139. Set-Back. Designed to restrain the movement of the rotor, the set-back assembly is a sequential falling leaf type of set-back device consisting of three interlocking leaves, two of which are spring loaded. Each leaf, moving about its individual pivot mounted on the frame, contacts the next, the first (unsprung) abutting the rotor stud, prevents movement of the rotor.

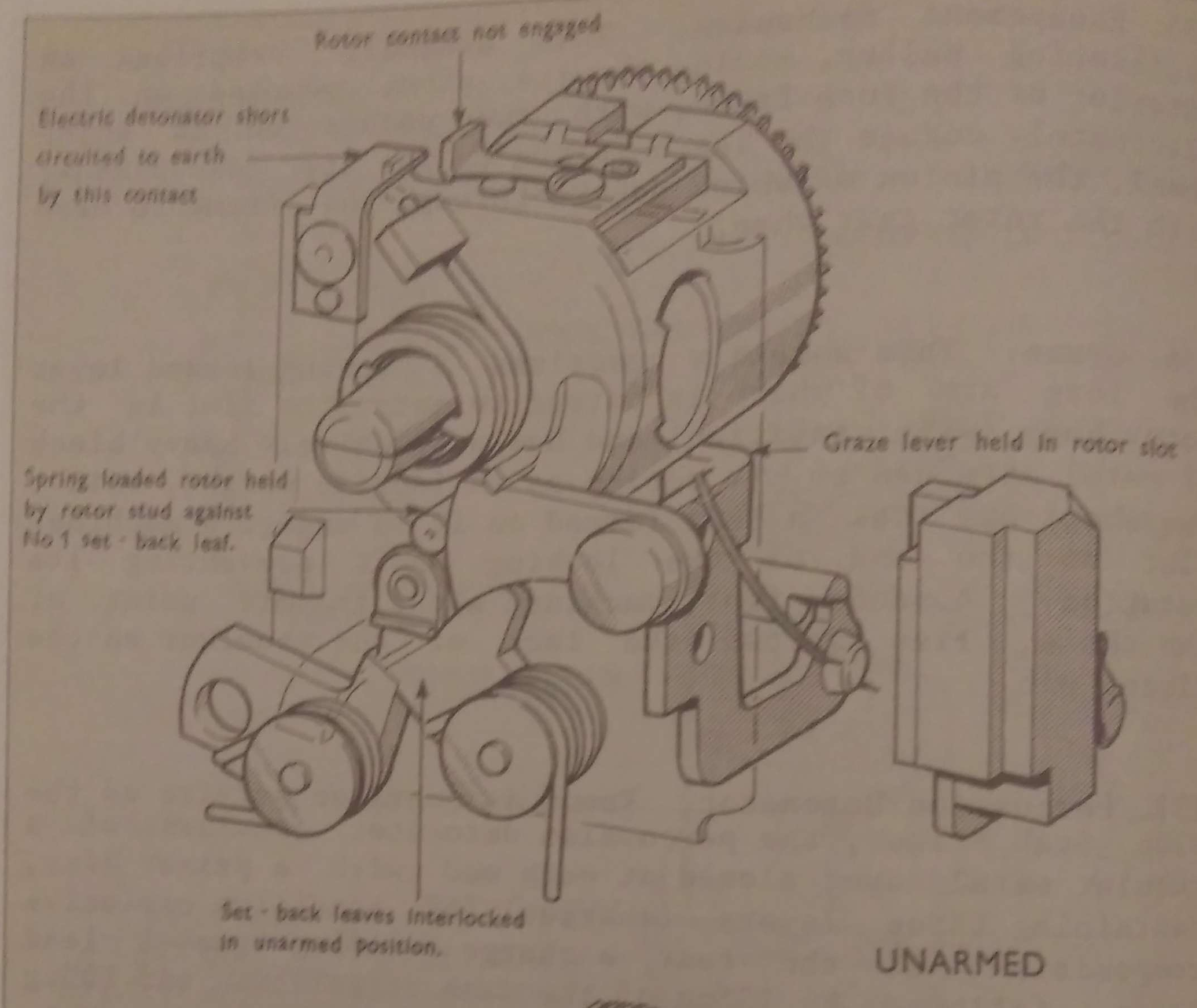

Rotor contact not engaged
Electric detonator short circuited to earth by this contact
Graze lever held in rotor slot
Spring loaded rotor held by rotor stud against No 1 set - back leaf.
Set - back leaves interlocked in unarmed position.
UNARMED
Stab primer out of alignment with the firing Pin
Firing pin held in unarmed position by locking shaft
Toe of graze lever preventing rotation of locking shaft
675/8

Fig 8 Fuze, M412 — Unarmed Positi

140. Firing Pin, Spring and Base Plug. Housed in a threaded bore in a thickened portion of the baseplate, the firing pin and spring are retained by an externally threaded base plug. The action of the spring forces the pin forward. A shoulder formed to the rear of the pin's point contacting the flat on the locking shaft, the firing pin is held in a 'cocked' position.

ACTION (FIGS 9 & 10)

141. On Firing. The set-back forces imparted to the rocket on firing cause the third and second set-back leaves to overcome the action of their springs and pivot in sequence, freeing the first leaf which then pivots to disengage the rotor stud. Free to move the rotor then turns, under the action of the torsion spring, through an angle of 90°, the speed of rotation being controlled by the escapement mechanism, to align the electric and percussion detonator with the electric circuit and the firing pin respectively and with the booster pellet. In addition, movement of the rotor frees the graze assembly lever from the restraint imposed on it by the slot in the rotor, leaving the graze assembly under the control of the 'creep' (leaf) spring and the action of inertia forces on the weighted block.

142. On Direct Impact. On the rocket striking the target at an angle up to 6° to the line of flight (direct impact), the crushing effect on the piezo-electric element in the rocket nose cap causes an electric voltage to be generated sufficient to fire the electric detonator. Simultaneously, the deceleration imparted to the rocket causes the graze assembly lever to overcome the action of the creep spring together with the inertia of the weighted block and rotate. Rotation of the lever causes it to disengage the locking shaft which, free from restraint, rotates clear of the firing pin as it moves forward, under the action of its spring, to fire the percussion detonator (stab primer). The firing of the detonator/s initiates the booster pellet which in turn detonates the warhead main filling.

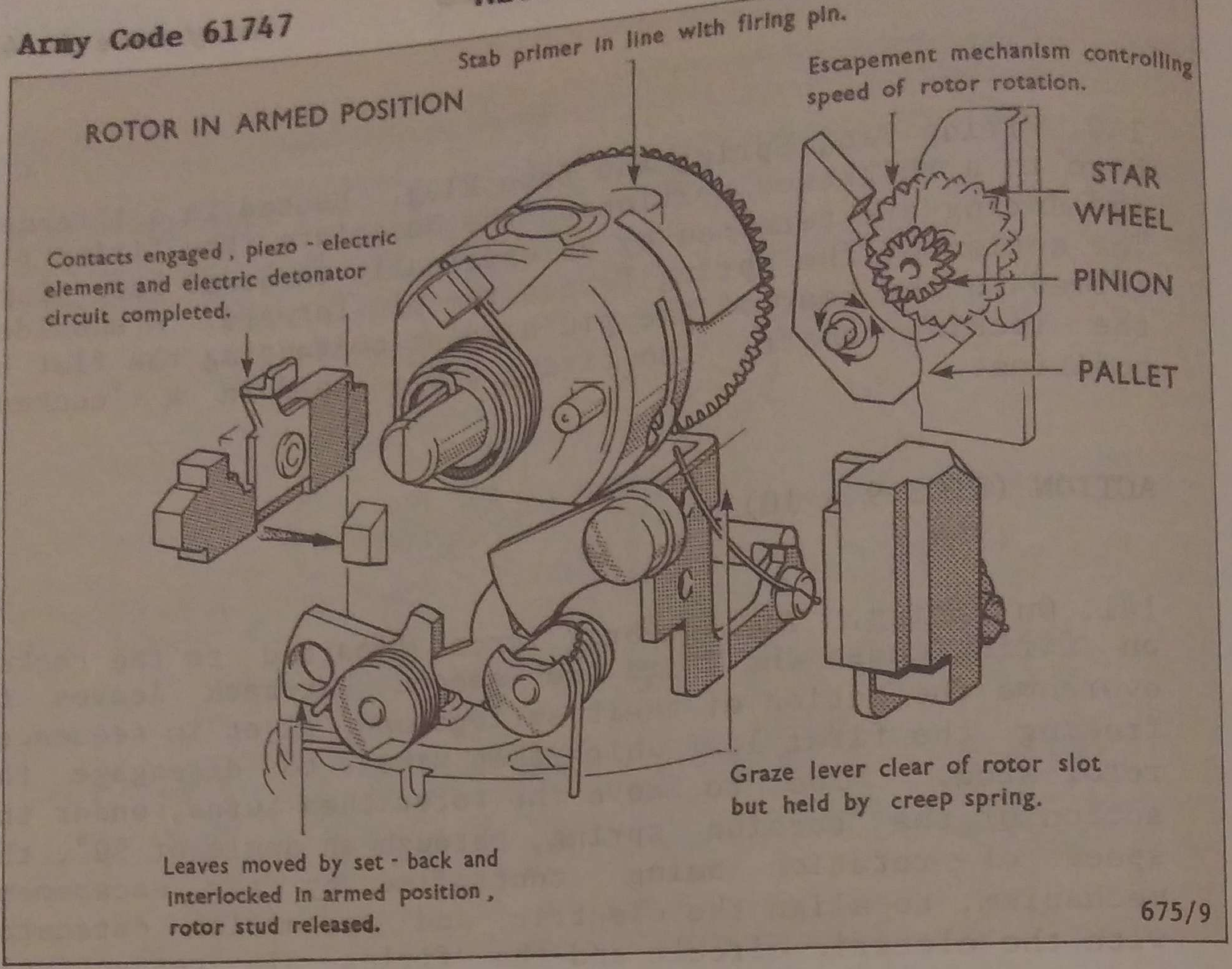

Stab primer in line with firing pin.
Escapement mechanism controlling speed of rotor rotation.
ROTOR IN ARMED POSITION
STAR WHEEL
PINION
PALLET
Contacts engaged, piezo - electric element and electric detonator circuit completed.
Graze lever clear of rotor slot but held by creep spring.
Leaves moved by set - back and interlocked in armed position, rotor stud released.
675/9

Fig 9 Action - Fuze,M412 - Armed During Flight

143. Graze Impact. In the event that the rocket strikes the target such that the piezo-electric element does not function, the deceleration imparted to the rocket causes the graze assembly to function as previously described.

SAFETY

WARNING

> The rocket becomes armed after travelling a distance of between 10 to 20 metres (11 to 22 yds). Any obstacle encountered in the flight path of the rocket, beyond 10m, is likely to cause the rocket to explode.

144. Up to the moment of firing, due to the position of the rotor, the electric and percussion detonator are misaligned, by 90°, with the electric circuit and firing pin respectively and the booster pellet. In addition, the

electric detonator is shorted to earth to guard against stray or induced voltages and the action of the graze assembly is prevented by the graze assembly lever being in engagement with the rotor slot.

145. On firing a delay of between 70 and 90 milliseconds is imposed, by the action of the escapement mechanism, before the fuze becomes armed.

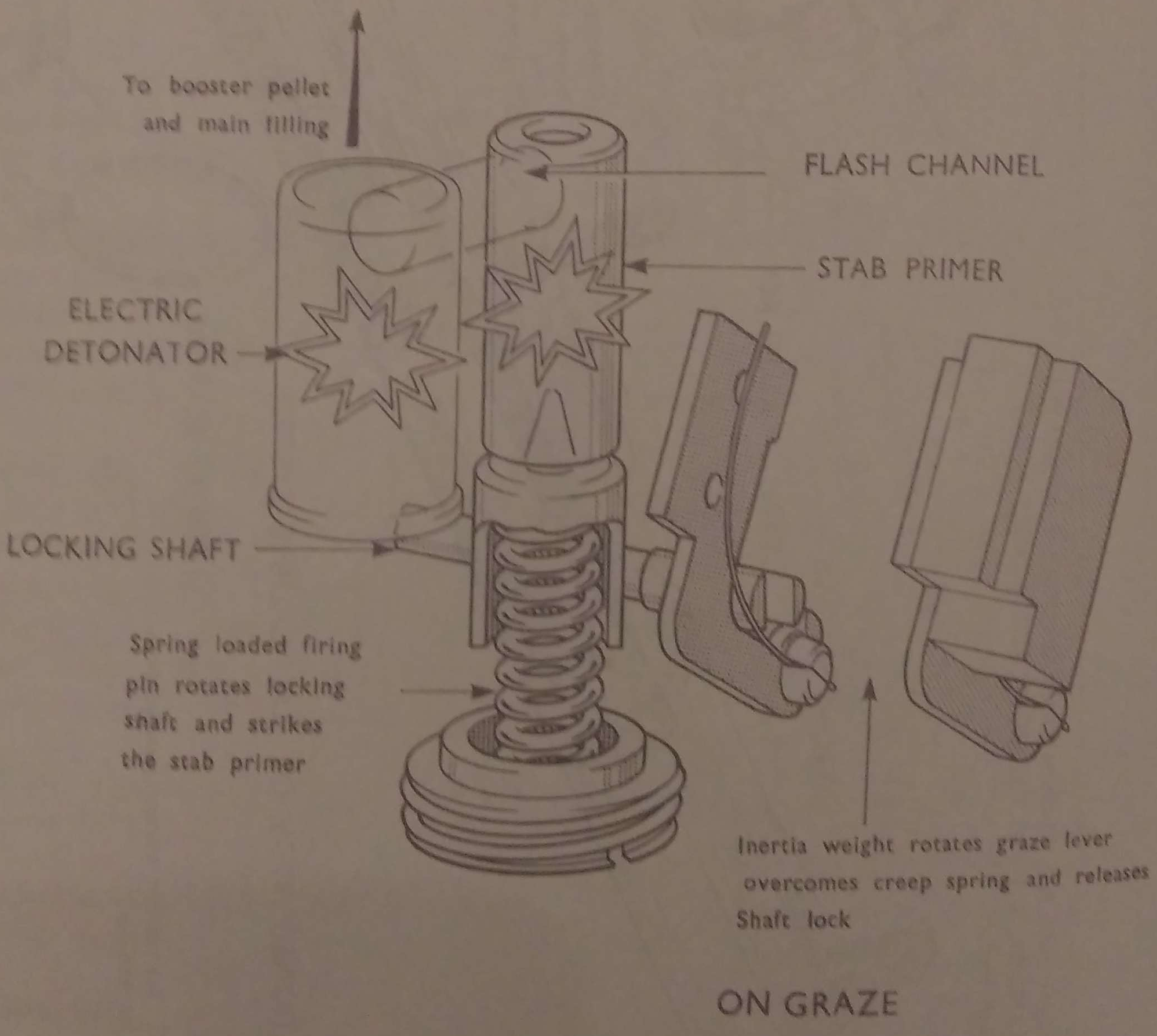
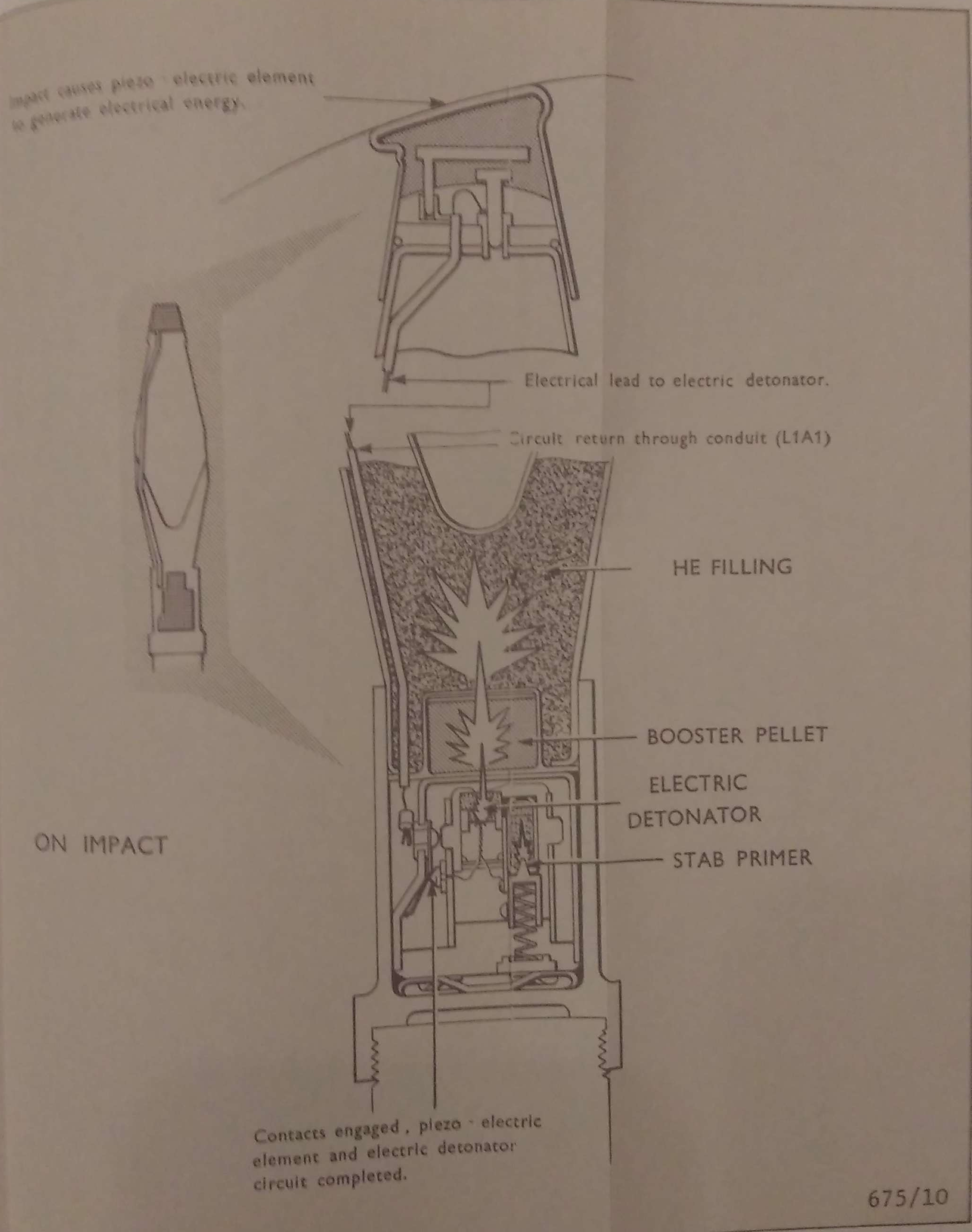

To booster pellet and main filling
FLASH CHANNEL
STAB PRIMER
ELECTRIC DETONATOR
LOCKING SHAFT
Spring loaded firing pin rotates locking shaft and strikes the stab primer
Inertia weight rotates graze lever overcomes creep spring and releases Shaft lock
ON GRAZE

Fig 10 Action on Impac


Impact causes piezo - electric element
to generate electrical energy.
Electrical lead to electric detonator.
Circuit return through conduit (L1A1)
HE FILLING
BOOSTER PELLET
ELECTRIC
DETONATOR
STAB PRIMER
ON IMPACT
Contacts engaged, piezo - electric
element and electric detonator
circuit completed.
675/10

on Impact

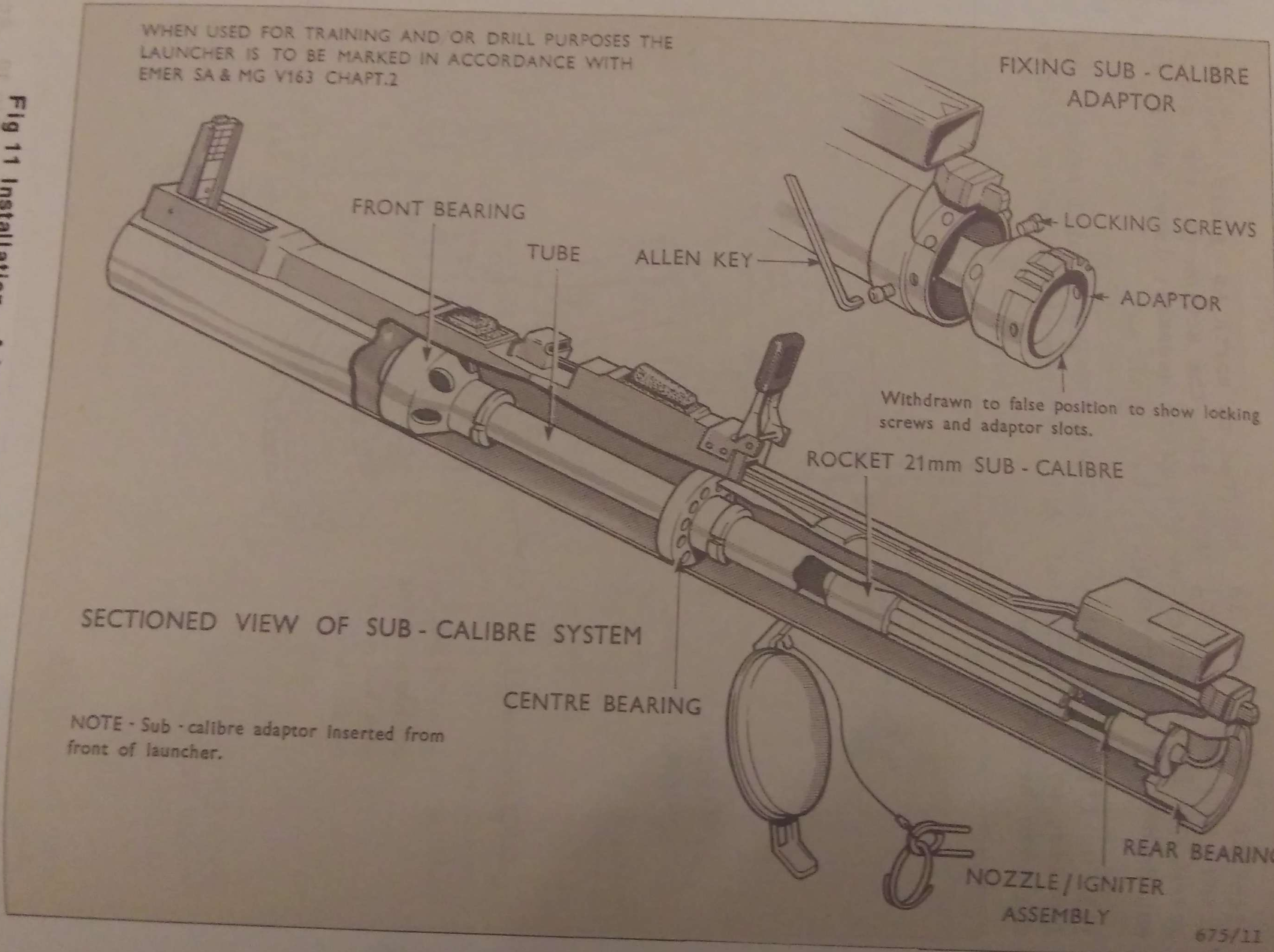


Fig 11 Installation - Adaptor, 21mm, 66mm Sub Calibre,L1A1

WHEN USED FOR TRAINING AND OR DRILL PURPOSES THE LAUNCHER IS TO BE MARKED IN ACCORDANCE WITH EMER SA & MG V163 CHAPT.2

NOTE - Sub - calibre adaptor inserted from front of launcher.

Withdrawn to false position to show locking screws and adaptor slots.

FIXING SUB - CALIBRE ADAPTOR
LOCKING SCREWS
ALLEN KEY
ADAPTOR
FRONT BEARING
TUBE
ROCKET 21mm SUB - CALIBRE
SECTIONED VIEW OF SUB - CALIBRE SYSTEM
CENTRE BEARING
REAR BEARING
NOZZLE / IGNITER ASSEMBLY
675/11

SECTION 5 - ROCKET, 21mm, 66mm SUB-CALIBRE, L1A1 - ADAPTOR, 21mm, 66mm SUB-CALIBRE, L1A1

INTRODUCTION (FIG 11)

146. Issued for use when training, the sub-calibre adaptor and rocket fitted to a used 66mm launcher, except for identification markings, fully resembles the 66mm system, its use effecting a considerable saving in cost.

147. The weight of the 'training system' approximates that of the 66mm system and the ballistics of the sub-calibre rocket almost match those of the 66mm rocket, the times of flight to 200 metres being equal.

148. Methods of handling and operation employed by the user to fire the training system are identical to those for the 66mm system. For details of actions to be taken peculiar to the sub-calibre rocket, in the event of a misfire see paras 218 & 219.

149. The life of an adaptor approximates 100 firings and once a launcher has been converted to accept an adaptor, a REME task entailing the drilling of two holes at the rear of the launcher inner tube and the addition of identification markings, fitment of a replacement adaptor can be undertaken at the firing range with the aid of a 3mm a/f socket head key wrench (Allen key).

150. Supplied in a tubular aluminium alloy container, the sub-calibre rocket is easily loaded into a converted launcher at the firing point with the aid of a crosspoint (Phillips) screwdriver and in flight traces its path out to 400 metres.

ADAPTOR

151. The sub-calibre adaptor consists of a smooth bore steel tube with three aluminium alloy bearings fitted, each of which is drilled with a series of holes, further reducing the weight.

152. The forward (sleeve) and central (disc) bearings are positioned along the tube, on split tapered externally threaded bushes, secured in place by threaded compression rings, whilst the rear bearing (chamber) screws directly onto the end of the tube, the end of which protrudes into the recess in the bearing (chamber) to act as a shoulder against which the rocket nozzle/igniter assembly abuts. Two threaded holes in the rear bearing receive the screws used to secure the adaptor within the launcher and a slot in the edge, aligned with that in the launcher inner tube, caters for the transmission line, whilst four grooves provide clearance for rivets at the rear of the tube.

ROCKET

153. The sub-calibre rocket consists of a solid steel head fitted to the forward end of a centrally placed steel rod, at the rear end of which is the nozzle/igniter assembly. Pressed onto a stud plate similar to that on the 66mm rocket, six sticks of tubular propellant surround the steel rod.

154. Nozzle/Igniter Assembly. A hollow steel cup-like item, the nozzle has six holes in the forward end, equally spaced around a hollow central boss. The forward end of the boss is internally screw threaded, to receive the end of the rod projecting rearward from the head, whilst the rear of the boss is chambered to house the red tracer element. The igniter assembly is similar to the M56 assembly used in the 66mm rocket, differing only in the shape of the plastics body which is parallel sided and has a flange formed at the rear, to abut the end of the adaptor tube. Fitted into the rear of the nozzle, the plastics body is crimped in position, the metal at the mouth of the nozzle being turned inward to enter a cannelure around the body just forward of the flange.

ACTION

155. The sequence of events on firing the sub-calibre system is as for the 66mm system, except that the propellant gases escape rearward through the holes in the nozzle and that, in the absence of a Round Lock, the flange at the rear of the igniter body registers the position of the 21mm rocket in the launcher.

SECTION 6 - MISCELLANEOUS DATA

156.

Weight kg(lb)	System 66mm	 21mm
Complete	2.34(5.2)	
Launcher	1.34(3.0)	
Adaptor	-	1.1(2.4)
Rocket	1.0(2.2)	195g(6.9oz)
Warhead	0.305(0.67)	-
Propellant	-	18g(0.64oz)
5 systems with inner pack	12.36(27.3)	-
15 systems with outer pack	49(108)	

157.

Length mm(in)		
Launcher closed	638(25.2)	
Launcher open	882.6(34.75)	
Rocket fins open	518(20.4)	-
Rocket	-	215(7.6)
Adaptor		625(23.6)

158.

Ballistics (range 200m at 20°C)		
Expected launch velocity m/s (f/s)	151(494)	147(481)
Time of flight (sec)	1.6	
Elevation (mils)	50.1	51.7

SECTION 7 - PACKAGING AND MARKING

159. The following figures (12 to 16) illustrate the method of packaging and markings employed.

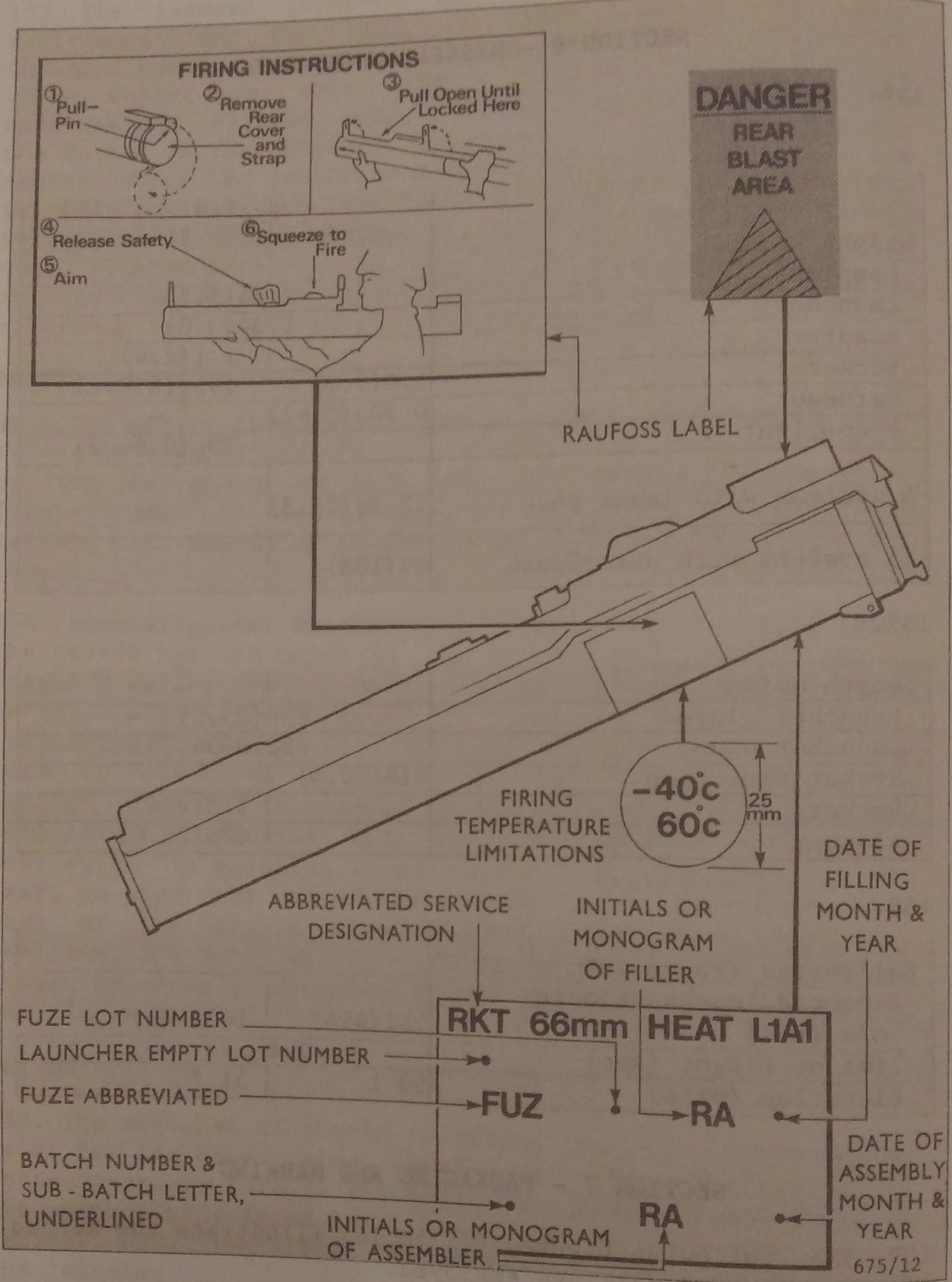

FIRING INSTRUCTIONS
① Pull-Pin
② Remove Rear Cover and Strap
③ Pull Open Until Locked Here
④ Release Safety
⑤ Aim
⑥ Squeeze to Fire
DANGER
REAR BLAST AREA
RAUFOSS LABEL
FIRING TEMPERATURE LIMITATIONS
-40°c
60°c
25 mm
DATE OF FILLING MONTH & YEAR
ABBREVIATED SERVICE DESIGNATION
INITIALS OR MONOGRAM OF FILLER
FUZE LOT NUMBER
LAUNCHER EMPTY LOT NUMBER
FUZE ABBREVIATED
RKT 66mm
HEAT L1A1
FUZ
RA
DATE OF ASSEMBLY MONTH & YEAR
BATCH NUMBER & SUB - BATCH LETTER, UNDERLINED
INITIALS OR MONOGRAM OF ASSEMBLER
RA
675/12

Fig 12 HEAT 66mm Launcher:- Marking

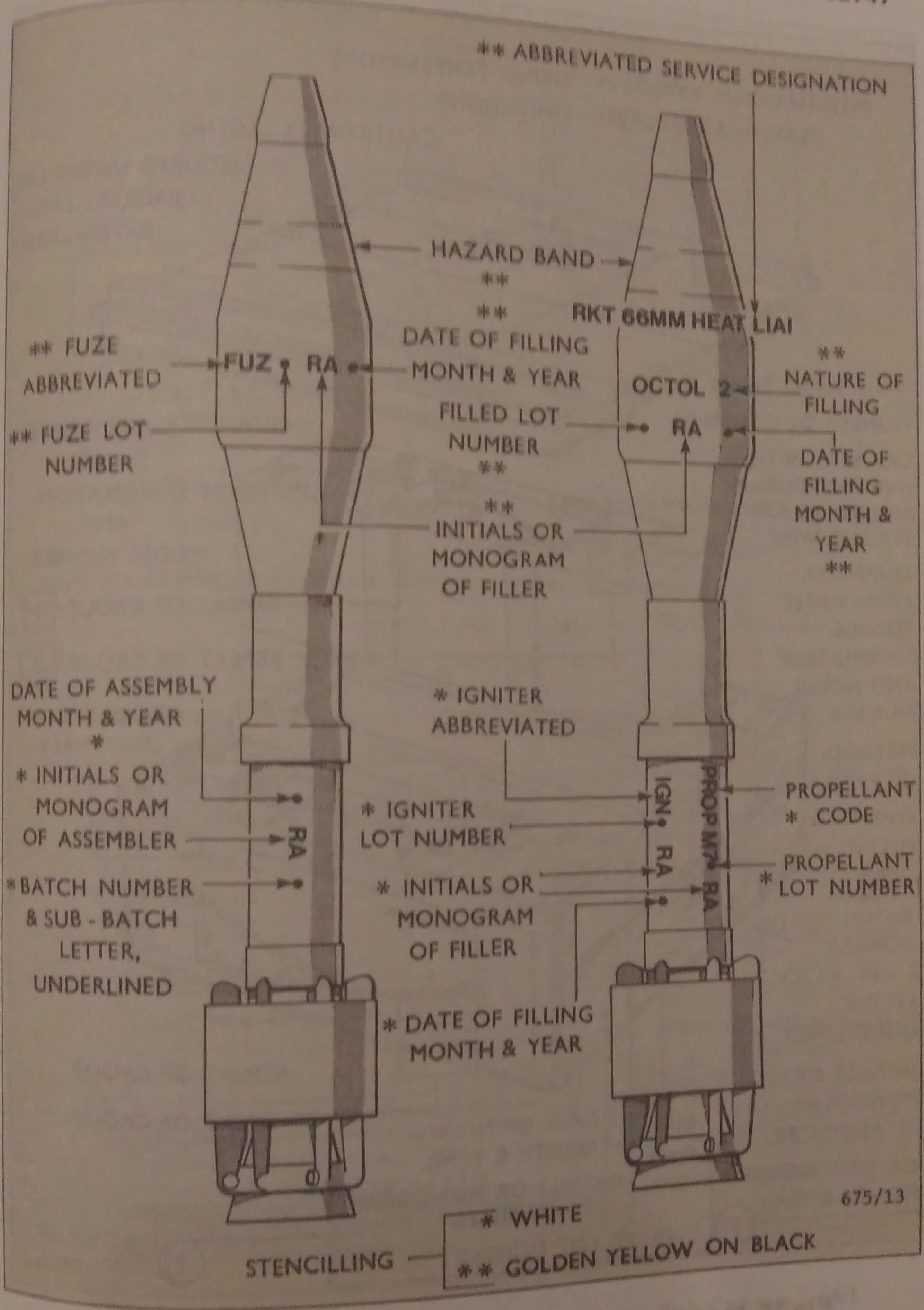


Fig 13 HEAT 66mm Rocket:- Marking

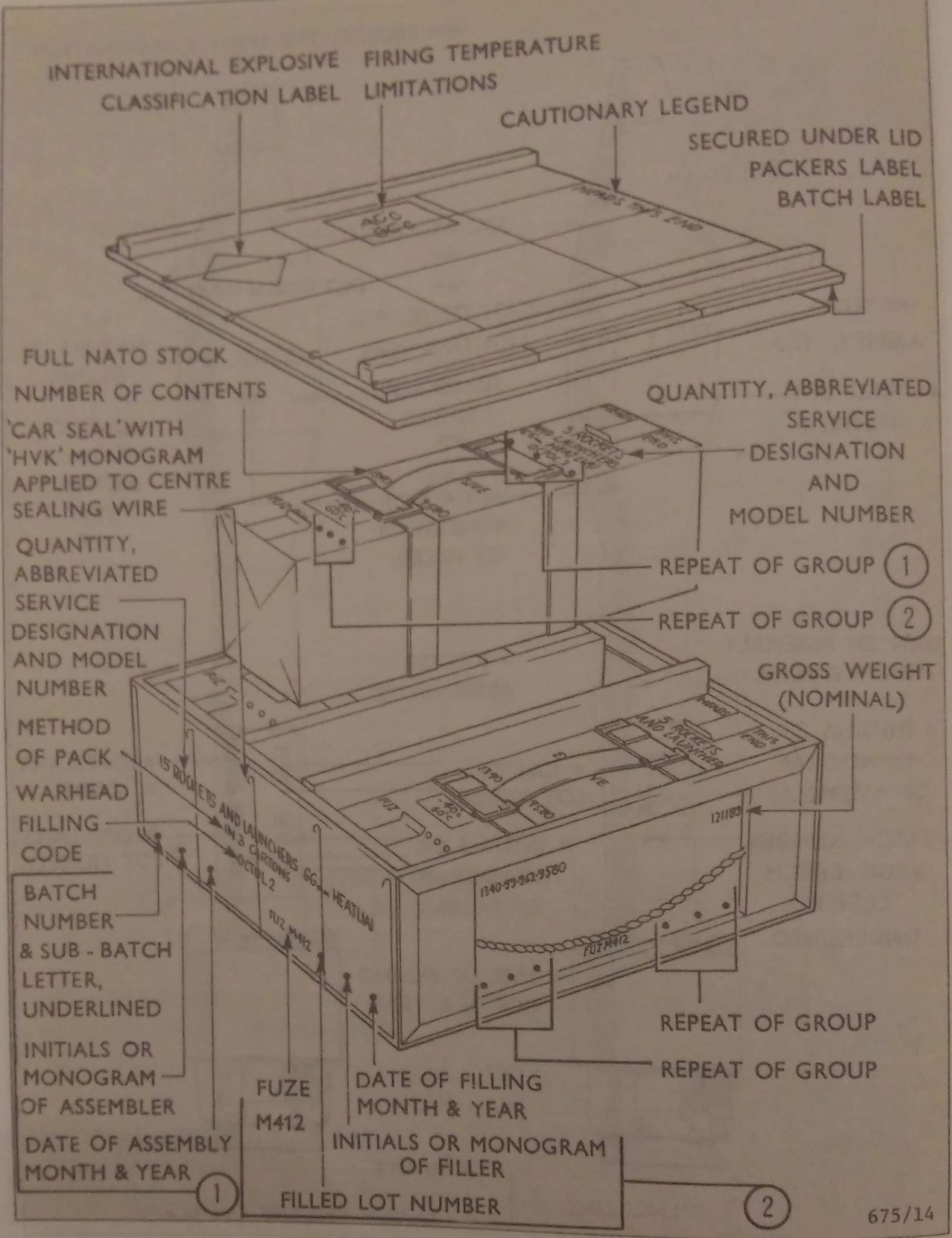

INTERNATIONAL EXPLOSIVE CLASSIFICATION LABEL
FIRING TEMPERATURE LIMITATIONS
CAUTIONARY LEGEND
SECURED UNDER LID
PACKERS LABEL
BATCH LABEL
FULL NATO STOCK NUMBER OF CONTENTS
'CAR SEAL' WITH 'HVK' MONOGRAM APPLIED TO CENTRE SEALING WIRE
QUANTITY, ABBREVIATED SERVICE DESIGNATION AND MODEL NUMBER
QUANTITY, ABBREVIATED SERVICE DESIGNATION AND MODEL NUMBER
REPEAT OF GROUP ①
REPEAT OF GROUP ②
METHOD OF PACK
WARHEAD FILLING CODE
GROSS WEIGHT (NOMINAL)
5 ROCKETS AND LAUNCHERS
15 ROCKETS AND LAUNCHERS 66 HEAT(UA)
IN 3 CARTONS
OCTOL 2
FUZ M412
1340-99-962-9580
121183
BATCH NUMBER & SUB - BATCH LETTER, UNDERLINED
INITIALS OR MONOGRAM OF ASSEMBLER
DATE OF ASSEMBLY MONTH & YEAR
①
FUZE M412
DATE OF FILLING MONTH & YEAR
INITIALS OR MONOGRAM OF FILLER
FILLED LOT NUMBER
②
REPEAT OF GROUP
REPEAT OF GROUP
675/14

Fig 14 Ammunition Container Assembly, L238A1:- Marking

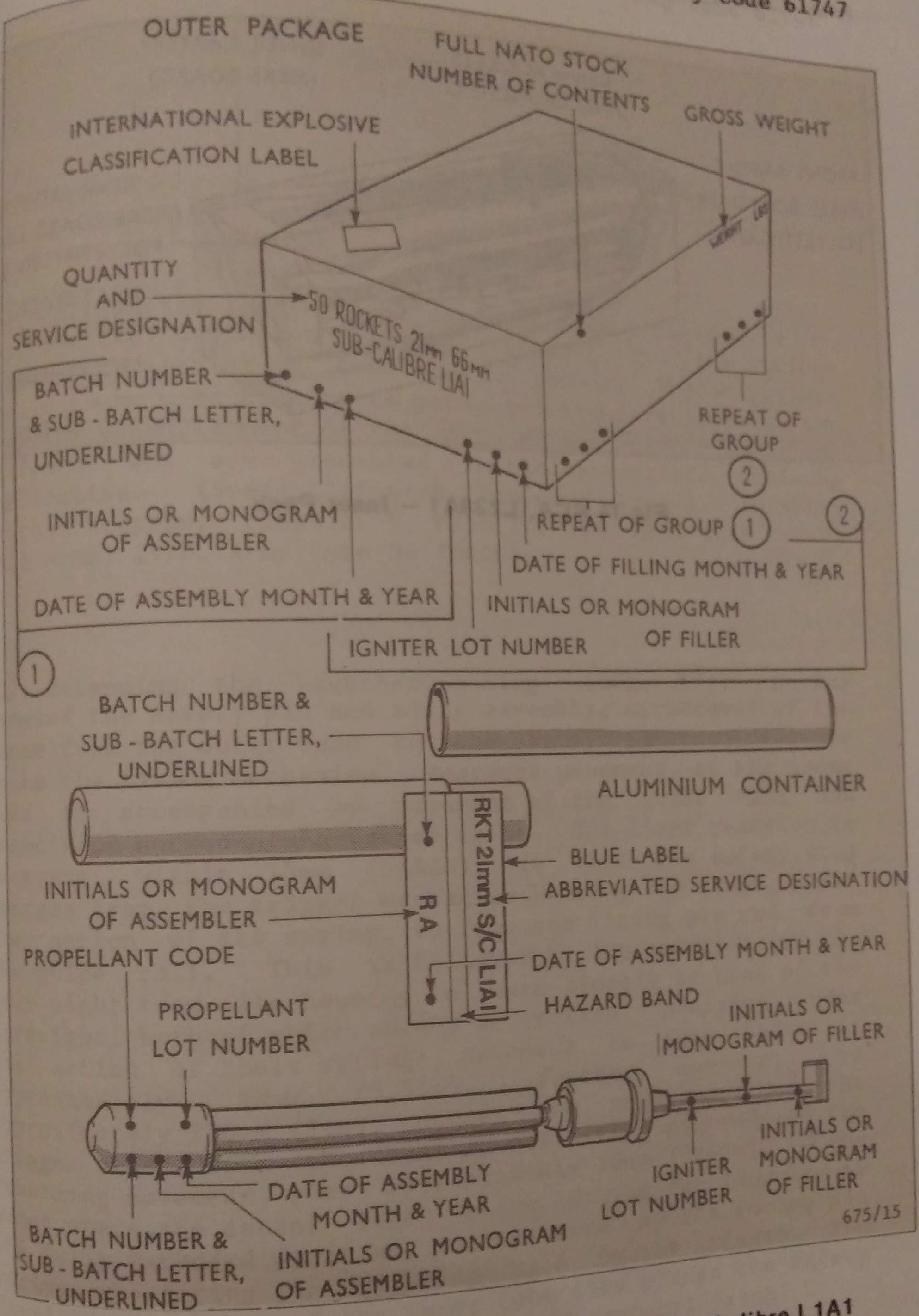

OUTER PACKAGE
FULL NATO STOCK NUMBER OF CONTENTS
INTERNATIONAL EXPLOSIVE CLASSIFICATION LABEL
GROSS WEIGHT
WEIGHT LBS
QUANTITY AND SERVICE DESIGNATION
50 ROCKETS 21mm 66mm SUB-CALIBRE L1A1
BATCH NUMBER & SUB - BATCH LETTER, UNDERLINED
REPEAT OF GROUP ②
INITIALS OR MONOGRAM OF ASSEMBLER
REPEAT OF GROUP ①
②
DATE OF FILLING MONTH & YEAR
DATE OF ASSEMBLY MONTH & YEAR
INITIALS OR MONOGRAM OF FILLER
IGNITER LOT NUMBER
①
BATCH NUMBER & SUB - BATCH LETTER, UNDERLINED
ALUMINIUM CONTAINER
RKT 21mm S/C L1A1
BLUE LABEL
ABBREVIATED SERVICE DESIGNATION
INITIALS OR MONOGRAM OF ASSEMBLER
R A
PROPELLANT CODE
DATE OF ASSEMBLY MONTH & YEAR
HAZARD BAND
PROPELLANT LOT NUMBER
INITIALS OR MONOGRAM OF FILLER
DATE OF ASSEMBLY MONTH & YEAR
IGNITER LOT NUMBER
INITIALS OR MONOGRAM OF FILLER
BATCH NUMBER & SUB - BATCH LETTER, UNDERLINED
INITIALS OR MONOGRAM OF ASSEMBLER
675/15

Fig 15 Package Details - Rocket, 21mm, 66mm Sub-Calibre,L1A1

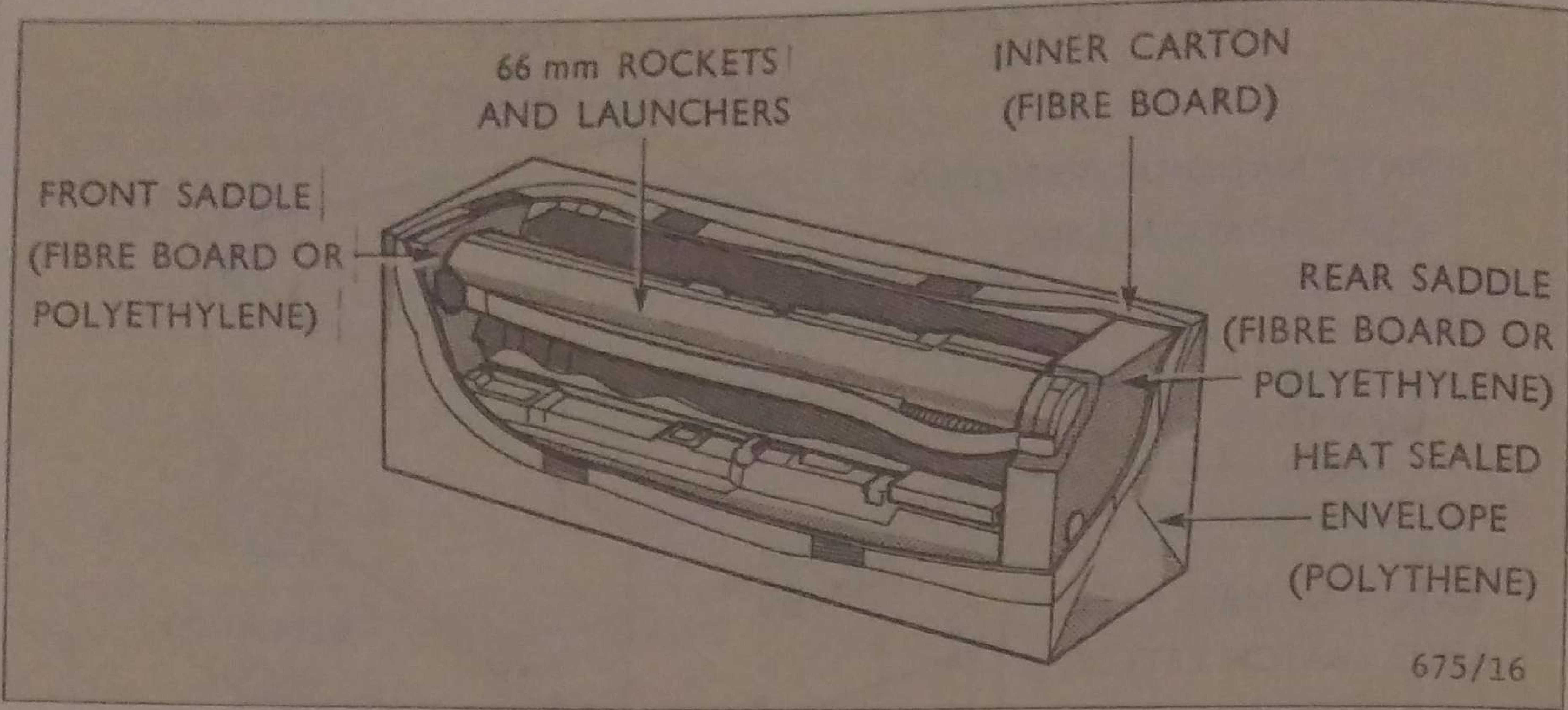


Fig 16 ACA, L238A1 – Inner Pack

CHAPTER 2

OPERATION

SECTION 1 - 66mm LAUNCHER

201. Introduction. The object of this chapter is to describe the operation of the launcher and the actions required in firing a 66mm or 21mm rocket. The authorised drills to be used by service personnel are formulated by the training establishment of the Arm of the Service using the equipment and are presented in the appropriate training publication. (See:- Infantry Training Vol 1. Infantry Platoon Weapons. Pamphlet 9, Part IV. 66mm Anti-Tank Rocket (All Arms) 1970. Army Code No 70626).

202. Extending the Launcher/Cocking (Fig 17). Having removed the safety pin and sling assembly, withdrawal of the inner from the outer tube to the fully extended position cocks the firing mechanism. Rearward movement of the inner tube is accompanied by movement of the guide rail and associated components attached to it. The first reaction to movement, within 15mm (5/8in), is that the safety stud emerges from the trigger mechanism housing and rises, under the action of its spring, to free the firing pin rod from the guide rail. This is followed by the emergence of the rear sight from its housing followed closely by that of the foresight, both of which assume a vertical position under the action of their springs, movement to this point is approximately 90mm (3.5in). Further movement, to approximately 230mm (9in), causes the engagement of the trigger sears with the bent on the firing pin rod and the remaining movement, over approximately 20mm (3/4in), to the point where the detent lever rises locking the launcher in the fully extended position, is resisted by the firing pin spring, the firing pin rod being held by the trigger. The final 20mm movement of the inner tube also places the safety sear under the control of the SAFE/ARM (safety) catch.

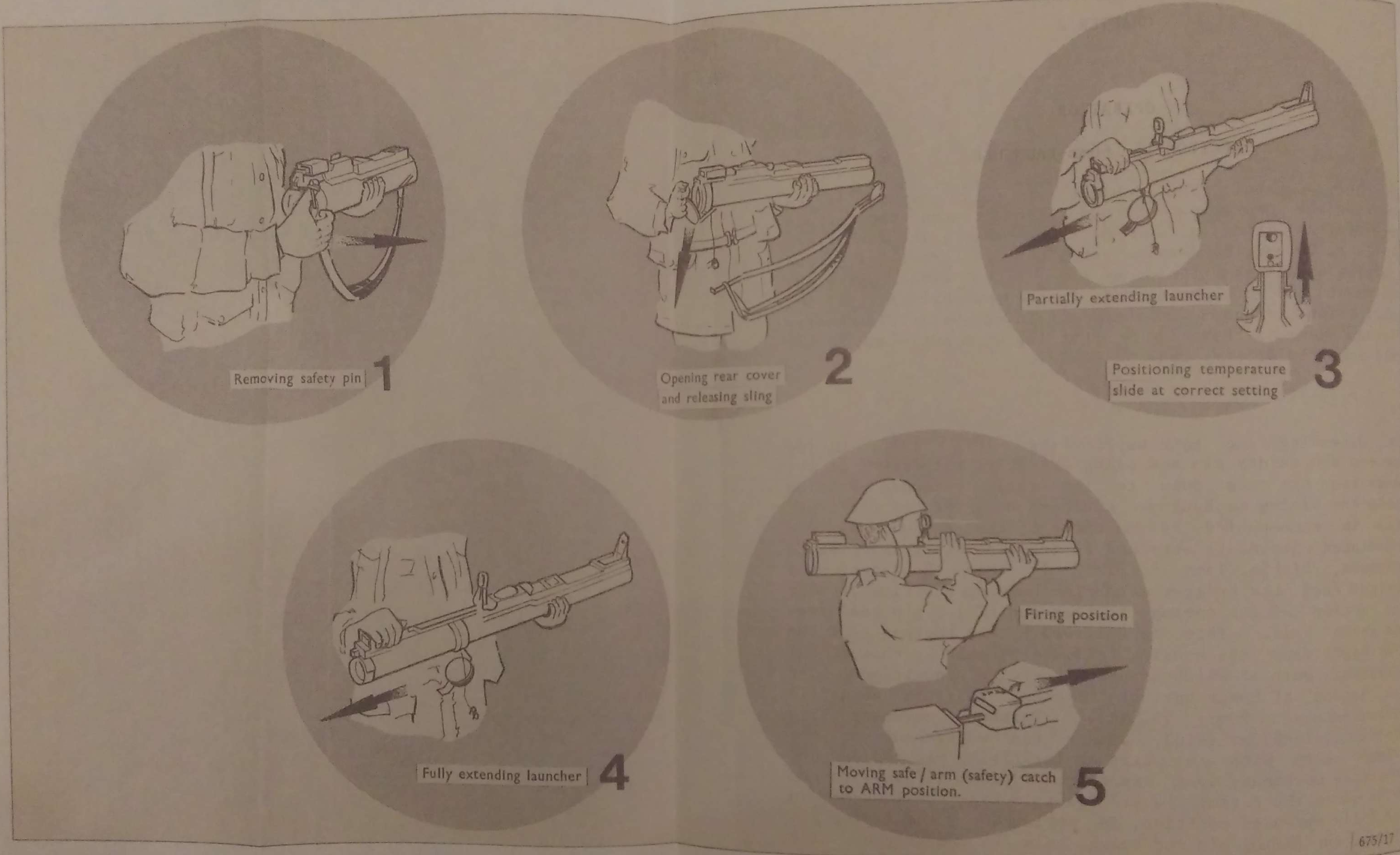

Removing safety pin
1
Opening rear cover and releasing sling
2
Partially extending launcher
Positioning temperature slide at correct setting
3
Fully extending launcher
4
Firing position
Moving safe / arm (safety) catch to ARM position.
5
675/17

Fig 17 Extending the Launcher/Cocking

203. SAFE/ARM (Safety) Catch. On full extension of the launcher the safety sear enters the plastics block, forming part of the catch, positioned beneath the trigger to prevent its movement. Movement of the catch towards the ARM position moves the block clear of the underside of the trigger and brings about the engagement of a metal plate on the block with the underside of the safety sear, causing the sear to rise up out of engagement with the firing pin rod. Full movement of the catch results in the safety sear engaging a notch on the top surface of the plate to hold the catch in the ARM position. Returning the catch to the SAFE position repositions the block beneath the trigger and allows the safety sear, under the action of its spring, to re-engage the firing pin rod.

204. Firing. Pressure on the trigger, with the SAFE/ARM (safety) catch set to ARM, causes disengagement of the trigger sears with the firing pin rod, consequently the rod moves rearward, under the action of the firing pin spring, allowing the firing pin to strike the percussion cap, part of the rocket motor.

205. Telescoping the Launcher. The launcher may be telescoped at any stage in the proceedings, care being needed to ensure that the sights are returned to their respective housings without damage. In the event that the launcher is cocked, pressure on the detent lever will cause initial forward movement of the inner tube, under the reaction of the firing pin spring, sufficient to uncock the launcher and, should it be set to ARM, move the SAFE/ARM (safety) catch to the SAFE position.

206. 66mm Rocket and Fuze. The operation of these two items, being outside the users control, are dealt with in Chapter 1, paras 130, 141, 142 and 143.

SECTION 2 - L1 LAUNCHER FITTED WITH THE 21mm SUB-CALIBRE ADAPTOR

CAUTION

Launchers fitted with sub-calibre adaptors must not be used for drill purposes.

207. Introduction. When fitted with an L1A1 66mm Sub-Calibre 21mm Adaptor the launcher, apart from special markings (Fig 11) looks, feels and operates as when in the 66mm role, the operation of the rocket being covered in para 155, but the user is faced initially with the task of loading and subsequently re-loading.

208. Loading (Fig 18). Telescope the launcher, thus ensuring that the firing mechanism is not cocked and remove the screws securing the bracket cover/primer retaining plate, together with the plate. Enter the 21mm rocket into the bore of the adaptor pushing it fully home to the point where the flange at the rear of the igniter assembly abuts the rear of the adaptor. Then, taking care not to damage the transmission line/fuze, insert the plastics block containing the percussion cap into the recess uncovered by the removal of the cover plate and replace the plate and screws. Close the rear cover to the launcher, securing it with the safety pin and fit the sling assembly.

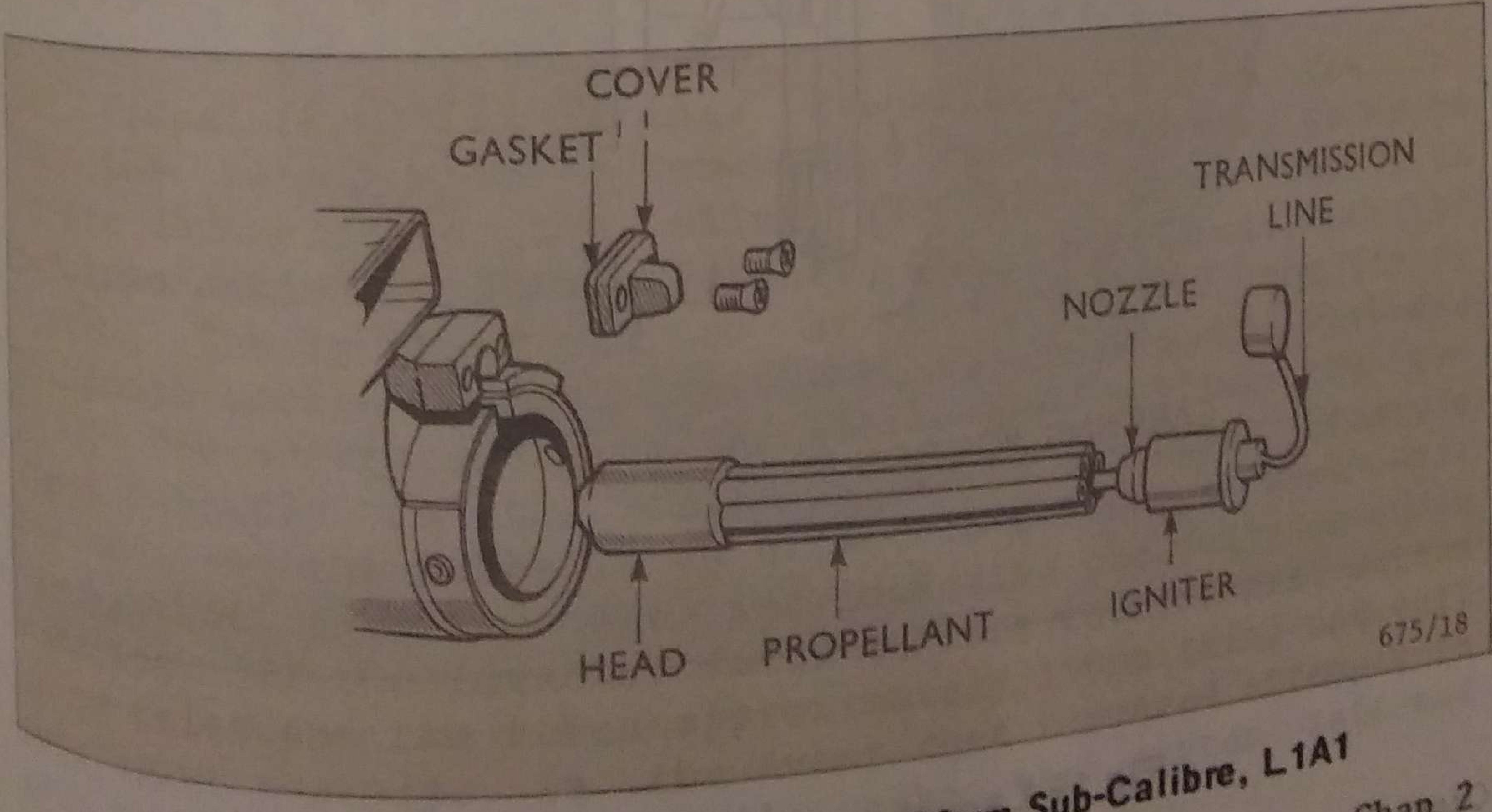


Fig 18 Installation:- Rocket, 21mm, 66mm Sub-Calibre, L1A1

209. Reloading. The reloading procedure is as for loading except that the block containing the percussion cap from the previous rocket has to be removed and the bore of the adaptor requires to be cleaned. Proper cleaning of the bore after each firing is essential to ensure ease of insertion of the next rocket and the certainty that on igniting it will leave the launcher. See para 305.

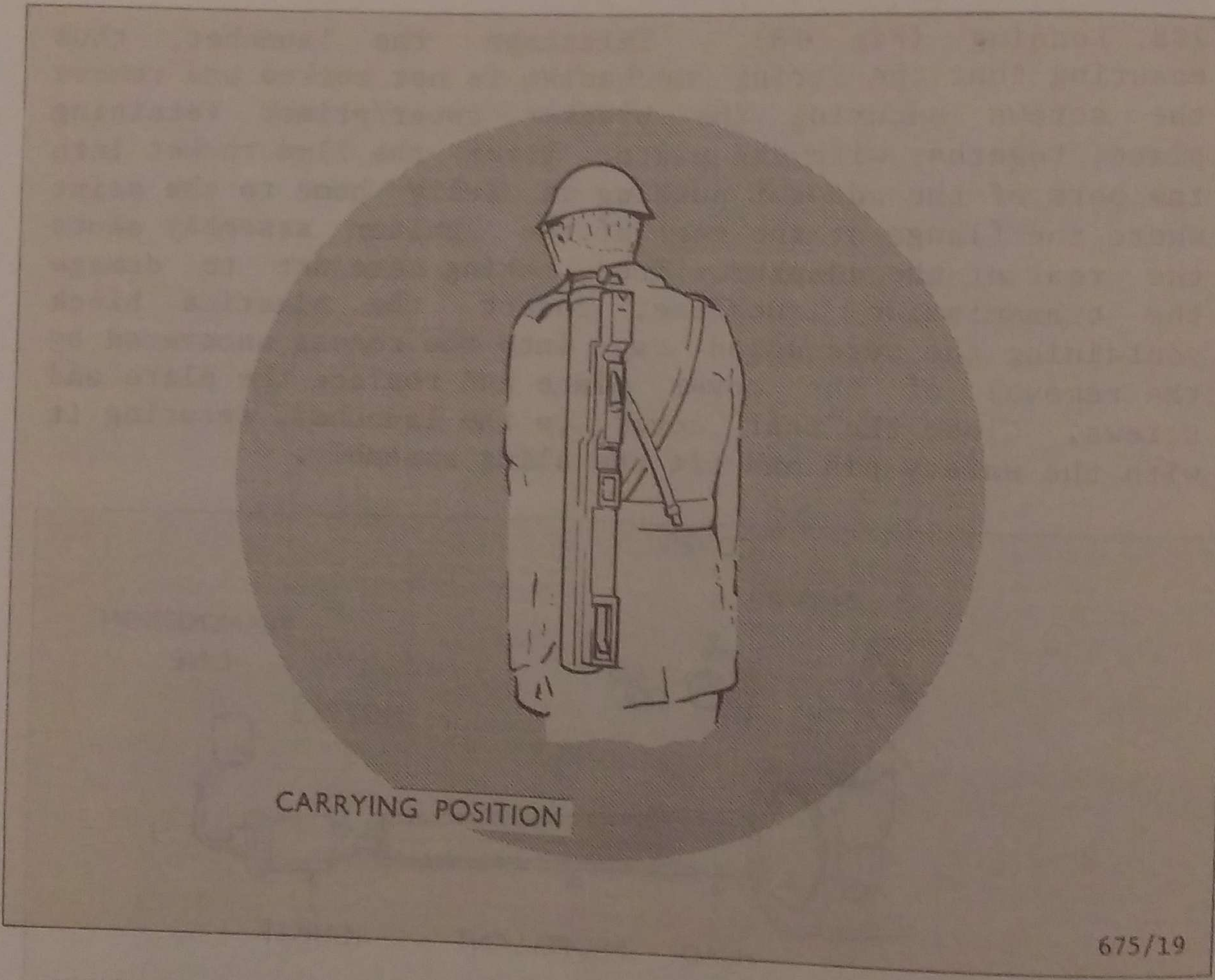


Fig 19 Launcher:- Carrying Position

SECTION 3 - L1 HEAT 66mm ROCKET AND LAUNCHER - 21mm 'TRAINING SYSTEM'

210. Introduction. This section outlines the actions required when using either the 66mm 'weapon system' or the 'training system', (para 219) but account must be taken of para 201.

211. Carrying the Weapon System (Fig 19). The system is designed to be carried slung from the shoulder by the sling assembly with the forward end of the launcher pointing to the ground. Carriage of the system with the launcher fully extended is deprecated since the act of extending the launcher cocks the firing mechanism (para 202).

WARNING

At all times, from the instant of picking up the system in order to prepare it for firing to the moment of discharge or, in the event that it is not fired, until the system is made SAFE, care must be taken to ensure that the launcher remains pointed towards the target and that personnel are kept clear of the danger areas.

212. Preparation for Firing. Preparing a system requires that the safety pin be removed, allowing the rear cover to rotate downward and the sling assembly, which should be retained against possible further use, to fall clear of the system. The launcher can now be extended and the firing mechanism cocked by grasping the backsight housing with one hand, the outer tube with the other and pulling the two tubes sharply to the fully extended position. Pressure applied to the tubes in an effort to telescope them will check that the launcher is locked in the fully extended position. If the launcher fails to lock the remedial action is to telescope the tubes approximately 150mm (6in) and pull them apart sharply. In the event that repeated attempts to cock the firing mechanism fail, make the system safe and place it to one side for disposal.

213. Firing. In order to fire the system, the inner tube is held on the shoulder with the rear cover pressed firmly against the front of the shoulder and the backsight touching the forehead. Having moved the SAFE/ARM (safety) catch to the ARM position pressure on the trigger causes the rocket to be fired (paras 204 and 130). After firing, in action, the launcher is disposable, but during training its retention for use with the sub-calibre adaptor is required.

214. Making an Unfired System Safe. An unfired system is made safe by telescoping the launcher (para 205) and inserting the firing pin, ensuring that both arms are utilised (para 119d). The sling assembly can now be replaced by placing the front cover in position and exerting a rearward pull on the hook, extending the springs sufficiently to enable the hook to engage the detents in the rear cover. Having been subjected to the ingress of atmosphere, systems which have been prepared for firing and then made safe should be marked accordingly in order that they are used first at the next firing.

FAILURES TO FIRE

215. If on pressing the trigger the rocket fails to leave the launcher the fault may be in the procedure or firing mechanism or may be due to a misfire or hangfire.

216. Misfire. A misfire is a complete failure to fire. A misfire, in itself is not dangerous but, since it cannot be immediately distinguished from a hangfire or failures in procedure or the firing mechanism, it must be treated as a hangfire until proven otherwise.

217. Hangfire. A hangfire is a delay in the functioning of the explosive train at the time of firing. The length of delay is unpredictable, ranging from a split second to several minutes, hence a hangfire is not immediately distinguishable from a misfire.

218. Action for Misfires. (The warning at the beginning of this section applies.) If on pressing the trigger the rocket fails to fire, move the SAFE/ARM (safety) catch to ARM and press the trigger a second time. In the event of a second failure, wait five minutes before telescoping the launcher, recocking the firing mechanism and attempting to fire again. If a further failure occurs, wait five minutes before telescoping the launcher, closing the rear cover and inserting the safety pin. The system should be deposited in a 'safe area' at least 50 metres to the flank of the firing position for later disposal. See Army Code No 70495. In action it may be an acceptable risk to dispense with the five minute waiting periods.

219. 21mm 'Training System'. The actions required when using the 'training system' are as for the 66mm system with the following exceptions:

a. In the absence of a Round Lock on the 21mm rocket, only one arm of the safety pin is used.

b. In the event of a misfire (para 218) it is necessary to remove the faulty rocket from the launcher and it is the rocket that is to be placed in the 'safe area'.

MAINTENANCE AND INSPECTION

66mm 'WEAPON SYSTEM'

301. No maintenance is required for the 'weapon system' but a degree of inspection is advisable on receipt, without recourse to extending the launcher, to check that the system is serviceable. Use of sharp instruments when opening packages should be avoided since it may lead to the systems becoming damaged.

302. The inspection should be aimed at ensuring:

a. Freedom from obvious signs of external damage.

b. The presence and correct fitment of the safety pin.

c. Freedom of movement of the SAFE/ARM (safety) catch.

d. That the transmission line/fuze is undamaged.

e. That the rim of the rocket venturi is free from cuts and nicks in excess of 3mm (1/8in) in width.

In the event that the inspection reveals faults, the system is to be placed in the 'safe area' for disposal by an Ammunition Technical Officer (ATO).

21mm 'TRAINING SYSTEM' (FIG 20)

303. In addition to a pre-firing inspection similar to that for the 'weapon system', the 21mm adaptor requires frequent cleaning to ensure that the 'training system' functions correctly. To this end the following special to purpose cleaning aids are provisioned.

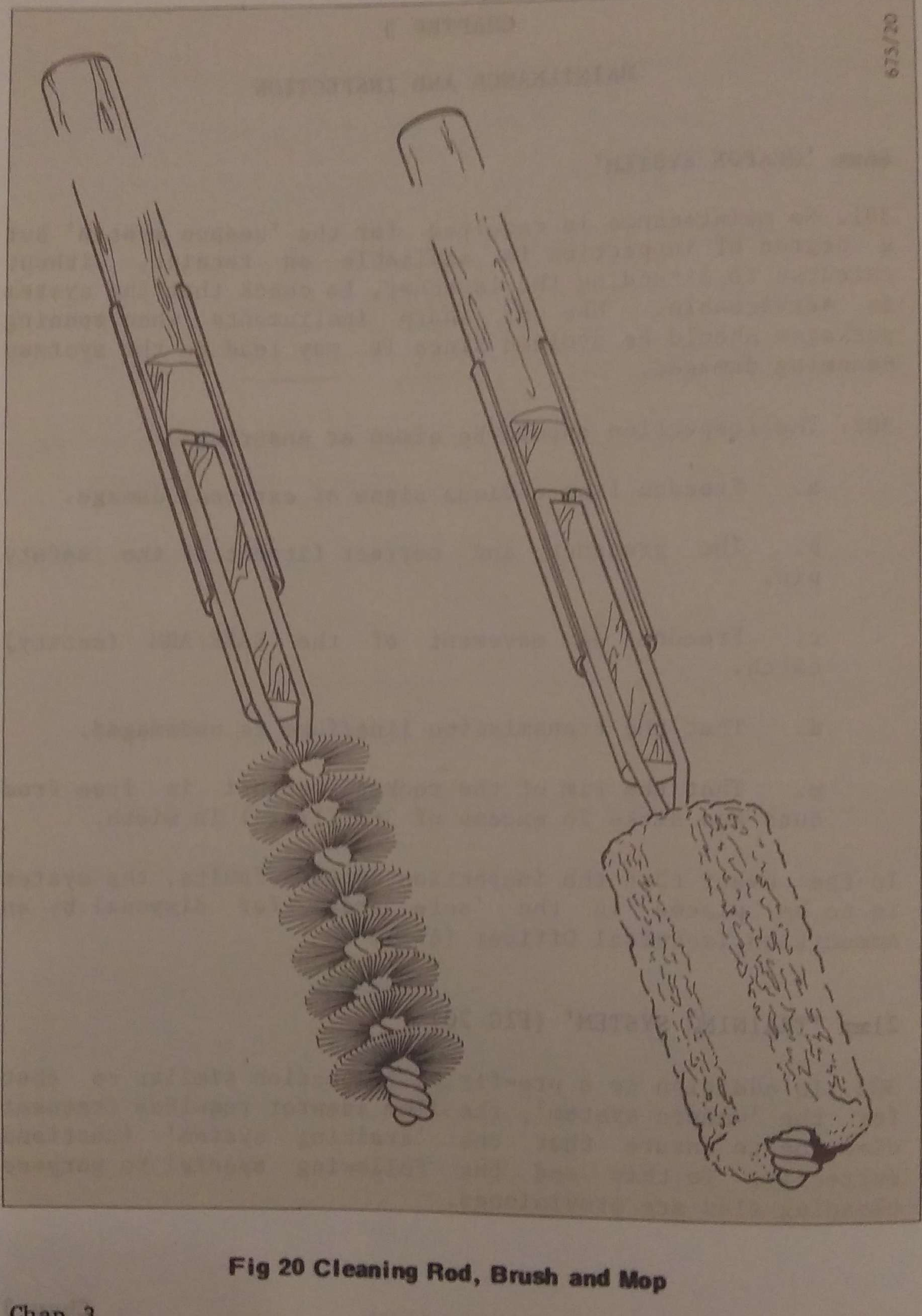


Fig 20 Cleaning Rod, Brush and Mop

a. C1/1005-99-961-8319. BRUSH, Cleaning, Small Arms.

b. C1/1005-99-961-8169. MOP, Cleaning, Small Arms.

c. C1/1005-99-961-8599. ROD, Cleaning, Small Arms.

Launchers which on inspection are deemed no longer fit for use in the 21mm role are to be returned to store for marking and use in the drill role.

304. Cleaning Before Firing. The bore of the adaptor requires to be dry cleaned using the mop and brush as appropriate, together with standard issue flannelette, to ensure freedom from oil, grease and corrosion.

305. Cleaning During Firing. Thorough dry cleansing of the adaptor bore using the brush or mop as appropriate is necessary AFTER THE FIRING OF EACH ROCKET, to ensure freedom from bore obstruction. In addition the rear face of the barrel and the recess housing the percussion primer block must be free from debris, to ensure correct seating of the next rocket.

306. Cleaning After Firing. The scouring of the adaptor bore with the brush, followed by dry cleaning with the mop and the application of oil OX-18 is necessary after firing. This cleaning and oiling operation should be repeated daily whilst the adaptor is in store.